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HANDBOOK FOR EVALUATING ECOLOGICAL EFFECTS OF POLLUTION AT DARC--ETC(U)  
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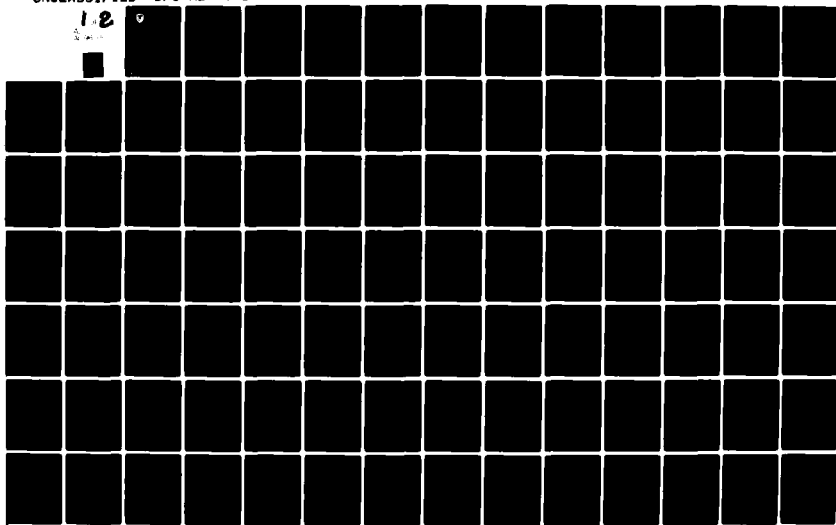
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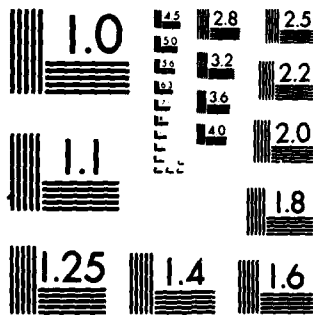
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DPG Document No. DPG HB 80-806 ✓

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HANDBOOK

FOR EVALUATING ECOLOGICAL EFFECTS OF POLLUTION  
AT DARCOM INSTALLATIONS

VOLUME 6

UNEXPECTED DECLINES IN ANIMAL POPULATIONS

DECEMBER 1979

U.S. ARMY DUGWAY PROVING GROUND  
Dugway, Utah 84022

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER TECOM Project No.0-CO-520-EQC-004	2. GOVT ACCESSION NO. AD-AD96 152	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Handbook for Evaluating Ecological Effects of Pollution at DARCOM Installations, Volume 6. Unexpected Declines in Animal Populations,		5. TYPE OF REPORT & PERIOD COVERED HANDBOOK
7. AUTHOR(s) Carlos F.A. Pinkham David A. Gauthier		6. PERFORMING ORG. REPORT NUMBER DPG-HB-80-806
9. PERFORMING ORGANIZATION NAME AND ADDRESS USA Dugway Proving Ground Environmental and Life Sciences Division Dugway, UT 84022		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS USA Dugway Proving Ground ATTN: MT-L Dugway, UT 84022		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 140
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE Dec 1979
		13. NUMBER OF PAGES 145
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Volume 6 of seven volumes dealing with evaluating ecological effects of pollution at DARCOM installations		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) pollution monitoring                      information systems ecology    environmental laws terrestrial ecosystems                      military activities aquatic ecosystems		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This handbook provides the DARCOM commander with a tool whereby he can respond quickly to a potential or actual pollution incident with a decisive program to evaluate the ecological effects of the pollution. To implement the procedures as set forth in the handbook, the commander will enlist the help of an environmental team composed of DARCOM scientists (or other suitable personnel) and individuals with limited ecological training (paraecologists) who will do much of the manual labor. With a given volume, the team can perform the required functions. (con't)		

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**SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)**

The handbook covers the following areas in seven volumes of which this is Volume 6: (1) basic questions that need answering, (2) conducting the preliminary investigation of the problem, (3) determining the specific effects of a pollutant (the first three volumes are essentially library efforts), (4) terrestrial sampling, (5) aquatic sampling, (6) unexpected declines in animal populations and (7) handling data.

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## CONCEPT

A fish kill occurs. Some cattle are found dead from an unknown cause. Oil-soaked birds are washed onto the shore. A bald eagle is found dead. These unexpected declines in animal populations are representative of incidents that an installation commander may face. His problem may be compounded by the lack of definitive guidance to assist him in making the proper decisions.

The first decision a commander will make is whether the incident is serious enough to warrant further action. It is impossible to cover all the cases that constitute an incident, but the following examples are offered as guidance. An incident is indicated if: (1) a large number of animals are found dead or dying, (2) a few animals are found dead or dying and the cause is unknown, (3) animals are threatened by the presence of a hazardous substance, and (4) a protected species<sup>1</sup> is found dead or dying. Obviously in the last example, some judgement is required. For example a bird protected only under the Migratory Bird Treaty Act that is killed accidentally by an automobile traveling down a highway, is not an incident. Subsequent sections provide further information to help the commander determine the seriousness of the situation and tailor his response accordingly.

In general, the most important action a commander will take in the event of an incident, is notification of the proper federal, state and local authorities.<sup>2</sup> This volume emphasizes that aspect because:

One, until the investigation is completed (sometimes a period of weeks or even months), the commander may not know whether his installation is to blame. An incident can occur in nature without the influence of man. For example, disease or sudden climatic changes may be the cause. Furthermore, activities outside the installation may be at fault. But until the investigation is completed, the installation becomes the focal point of the incident.

Two, the incident may involve a zoonotic disease (a disease of animals which may affect man). Because human health may be at stake, professional help will be required to fulfill the commander's responsibility for the welfare of his personnel.

<sup>1</sup>Protected species should be identified in the "Installation Environmental Impact Assessment" (refer to Volume 2, Section A.2.e.(1) of the handbook). Also see Part 3 page 3-1 and State Agencies page 2-48.

<sup>2</sup>In the unlikely event the incident threatens national security, contacts outside Department of Army will be made at higher headquarters.

Three, independent investigators lend credibility to the findings and supplement the expertise available on the installation, thus insuring the expeditious identification of the cause.

Four, if the incident originated on the installation through the inadvertent release of a hazardous substance or involves or threatens either a state or federally protected species, reporting of the incident is required by law.

The Commander will assign responsibilities for the various activities according to his available resources. In some instances, specific resources are best suited to a given action and are so identified. Because there frequently may be a threat to human health, the commander of the medical activity on the installation usually should have a key role in the evaluation of the incident.

### USE OF THIS VOLUME

This volume is divided into four parts. Part 1 is a matrix which identifies agencies that can become involved in various aspects (investigation, cleanup, etc.) of an incident. Part 2 provides the addresses of these agencies and a brief description of the nature of their involvement. Legal considerations are addressed in Part 3. Part 4 presents the techniques for obtaining the proper samples for analysis during the investigation of the cause of the incident and describes other activities such as animal rescue.

Extensive research has been performed to provide current information on leading agencies that may become involved in various aspects of an incident. However, if local requirements dictate additional agencies not listed or newer techniques become available, request that information be sent to:

Commander  
USA Dugway Proving Ground  
ATTN: STEDP-MT-L  
Dugway, UT 84022

for possible inclusion in the next revision of the handbook.

### FOREWORD

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NOTE

The pronoun "he" is used in this volume as an impersonal pronoun which encompasses both he and she and has no intent of personal reference or connection

NOTES

## PART 1 - MATRIX OF AGENCY INVOLVEMENT (Figure 1-1)

### COMMANDER'S ACTION

When necessary, some or all of the following actions can be initiated as soon as an incident is discovered:

1. Notification: If agencies with a need to know exist, they will be notified.
2. Data Repositories: If agencies maintain data bases on sudden declines in the animal populations involved, they should be notified.
3. Animal Rescue: If injured animals are present, they may require care or euthanasia.
4. Investigation of Cause: If the cause of the incident is unknown, the cause will be determined by local and/or independent investigators.
5. Cleanup: If carcasses or spilled material are present, they will be removed and the area restored.
6. Damage Assessment: In some instances, a damage assessment will be made to fix the amount of possible monetary liability.<sup>1</sup>

*(The above actions are found along the left side of the matrix.)*

### ENVIRONMENTAL-TAXA CATEGORIES

An incident can occur in one or more of the following environments where it can involve one or more taxa of animals:

#### MARINE AND ESTUARINE

Invertebrates

Fish

Waterfowl

Mammals (i.e.; whales, sea otters, sea lions, seals and walruses)

#### FRESHWATER

Invertebrates

Fish

Waterfowl

<sup>1</sup>Refer to volumes 4 and 5 for damage assessment techniques.

LAND

Invertebrates

Herptiles (amphibians and reptiles)

Birds

Mammals (including those that enter freshwater, e.g.; beaver  
and muskrat)

*(The above categories are found along the top of the matrix.)*

SAMPLE USE OF MATRIX

A commander may wish to obtain assistance in determining the cause of an incident involving freshwater waterfowl. Using the matrix, he would find the box representing the intersection of the action: Investigation of Cause and the environment-taxa: FRESHWATER Waterfowl. The Indices listed in the box refer the commander to agencies that can provide assistance and the key to these indices at the bottom refers him to the pages in Part 2 where the nature of the assistance is discussed.

Environment Taxa	MARINE AND ESTUARINE				FRESHWATER				LAND															
	Invertebrates		Fish		Waterfowl		Mammals		Invertebrates		Fish		Waterfowl		Mammals		Invertebrates		Herptiles <sup>a</sup>		Birds		Mammals	
Action																								
Notification	A1 E1 I1a* A3 I1* P6 C1 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 H1 I1a* C1 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 H1 I1a* C1 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 E1 I6 A2 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 E1 I6 A2 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 E1 I6 A2 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 E1 I6 A2 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 E1 I6 A2 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 E1 I6 A2 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	A1 E1 I6 A2 H1 I1a* A3 I1* P6 D1 I2 S1 D2 I3 S2 D3 I4 T1 D4 I5 T1a* E1 I6	
Data Repositories	D4a P5 E1a T1a H1	C1a H1 D4a P5 E1a T1a P1	D4a P2 D5a P5 E1a T1a P1	C1a P5 D4a S1* E1a T1a P2	D4a P5 D5a T1a E1a H1	D4a P5 D5a T1a E1a H1	A1a H1 A1b P5 D4a T1a E1a	D4a H1 D5a P5	D4a H1 D5a P5	D4a H1 D5a P5	A1a H1 A1b P5 D4a	A1a H1 A1b P5 D4a	D4a H1 D5a P5	A1a H1 A1b P5 D4a	A1a H1 A1b P5 D4a	D4a H1 D5a P5	D4a H1 D5a P5	D4a H1 D5a P5	D4a H1 D5a P5	D4a H1 D5a P5	D4a H1 D5a P5	D4a H1 D5a P5	D4a H1 D5a P5	
Animal Rescue	P7	P7	I1 S1 P4 T1a P7	P7 S1* T1	P7	P7	I1 S1 P4 T1a P7	P7	P7	P7	P7	I1 S1 P4 T1a P7	P7	P7	P7	P7	P7	P7	P7	P7	P7	P7	P7	P7
Investigation of Cause	C1a H1 D3 I1 D4 I1b+ D4a I1c+ D4a I1c+ E1 S1 E1b+ S2 E1c T1a E1d T1a	C1a I1 D3 I1b+ D4 I1c+ D4a I1d+ E1 I1e E1b+ S1 E1c S2 E1d T1a	H1 D3 I1 D4 I1b+ D4a I1c+ E1 I1d+ E1 I1e E1b+ S1 E1c S2 E1d T1a	C1a* H1 D3 I1* D4 I1b+ D4a I1c+ D4a I1c+ E1 S1 E1b+ S2 E1c T1a E1d T1a	D3 I1 D4 I1b+ D4a I1c+ E1 S1 E1b+ S2 E1c T1a E1d T1a	I1 D3 I1b+ D4a I1c+ E1 S1 E1b+ S2 E1d T1a H1	I1 A1a I1b+ A1b I1c+ A2 I1d+ D3 I1e D4 I1f D4a I1g D4a I1h S2 I1i T1a	D3 H1 D4 I1 D4a I1b+ D5a I1c+ E1 I1d+ E1b+ S1 E1c S2 E1f T1a	D3 H1 D4 I1 D4a I1b+ D5a I1c+ E1 I1d+ E1b+ S1 E1c S2 E1f T1a	D3 H1 D4 I1 D4a I1b+ D5a I1c+ E1 I1d+ E1b+ S1 E1c S2 E1f T1a	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1	A1a H1 A1b P5 D4a E1b+ E1f A1a H1 A1b I1 A2 I1c+ D3 I1d+ D2 I1e D3 I1f D3 I1g D4 I1h S1 I1i D4a I1j S2 I1k E1				
Cleanup	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a S1*	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	E1 T1 P3 T1a	
Damage Assessment	E1d	E1d P1	E1d P1	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	E1d	

<sup>a</sup> Reptiles and Amphibians

KEY

Index	Agency	Page	Index	Agency	Page
A	Department of Agriculture	2-3	I	Department of the Interior	2-24
C	Department of Commerce	2-11	P	Private sector	2-49
D	Department of Defense	2-14	S	State agencies	2-48
E	Environmental Protection Agency	2-18	T	Department of Transportation	2-44
H	Department of Health, Education and Welfare	2-23			

Example for Identifiers:

A1 or A1a refers to a specific organization within the Department of Agriculture. (See Part 2)

\*A legal requirement exists. The discussion of the identifiers given in Part 2 will refer to the governing law or regulation, Part 3 will cover its application in the given situation.

\*Laboratory capability

Figure 1-1. Matrix of Agency Involvement

## PART 2 - DETAILS OF AGENCY INVOLVEMENT

### INTRODUCTION

In part 2 a summary of the outside agency's areas of concern follows the index and title of the agency. A further summary of the areas of concern follows the index, address and phone number of each subordinate agency.

Only a few of the entries in each action/environment-taxa box of the matrix will be used for a given incident. The commander must decide which ones are pertinent based on: (1) the specific taxon involved in the incident, (2) the summary for each major agency and (3) the summary for each subordinate agency.

Most agencies require the information in Appendix A, Fact Sheet on the Incident, before they will respond to a notification or request. Therefore, gather the information required before making any phone calls.

As soon as the Fact Sheet is completed, alert the following DA agencies whether or not they are included in local protocols:

Next Higher Command Environmental Quality Coordinator

DARCOM Installation Services Activity (refer to Index D)

DARCOM Environmental Quality Coordinator (refer to Index D)

The contact point for each agency (signified by a letter followed by a number) is given in the notification row of the matrix. This individual has been designated by his agency as the first person in his chain of command to receive communications from outside his agency.

For example, when the commander has decided to contact E1b in the "Investigation of Cause/FRESHWATER Waterfowl" box, the first person to call is indicated by E1 in the "Notification/FRESHWATER Waterfowl" box. The point of contact will generally call the agencies requested (E1b in the above example).

NOTE

THE TERMS "WILL ASSIST", "WILL BECOME INVOLVED IN", ETC. ARE USED IN THE INDICIES BUT DO NOT IMPLY AN OBLIGATION ON THE PART OF THE DEPARTMENT/AGENCY/GROUP LISTED.

## INDEX A. DEPARTMENT OF AGRICULTURE (USDA)

This department is concerned primarily with incidents that threaten or involve domestic animals and secondarily with incidents that threaten or involve animals on National Forest Service Land (refer to Index A3). If the incident is severe enough to require emergency measures or involves domestic bees, refer to Index A1, otherwise refer to Index A2.

### Indices

A-1 - Military Liason Officer  
Emergency Programs  
Veterinary Services  
Animal and Plant Health Inspection Service  
U.S. Department of Agriculture  
Federal Building, Room 752  
Hyattsville, MD 20782

Phone: 301 436-8097/8095

Agency is point of contact for assistance from the Department of Agriculture, except for assistance routinely provided by the veterinarian-in-charge (VIC) (A2). If the incident involves domestic bees, also see Part 3, paragraph g.

---

A1a - Veterinary Services Laboratories (VSL)  
Animal and Plant Health Inspection Service  
U.S. Department of Agriculture  
P.O. Box 70  
Ames, IA 50010

Phone: 515 232-0250

Agency concerned with native (as opposed to exotic) diseases in domestic animals. Will provide a field diagnostician for severe disease outbreaks. Will perform diagnostic studies for bacterial, viral, mycotic and parasitic disease as well as toxic conditions in cases of genuine emergency. All shipments must be approved ahead of time by the Emergency Programs Staff, VSL or by the area VIC (A2).

---



## Indices

A1b - Plum Island Animal Disease Center  
Agricultural Research Service  
U.S. Department of Agriculture  
P.O. Box 848  
Greenport, NY 11944

Phone: 516 323-2500

Agency concerned with diseases of exotic nature (those not normally found in the U.S.).

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A2 - Veterinary Services Programs  
U.S. Department of Agriculture  
(See Figure 2-1.)

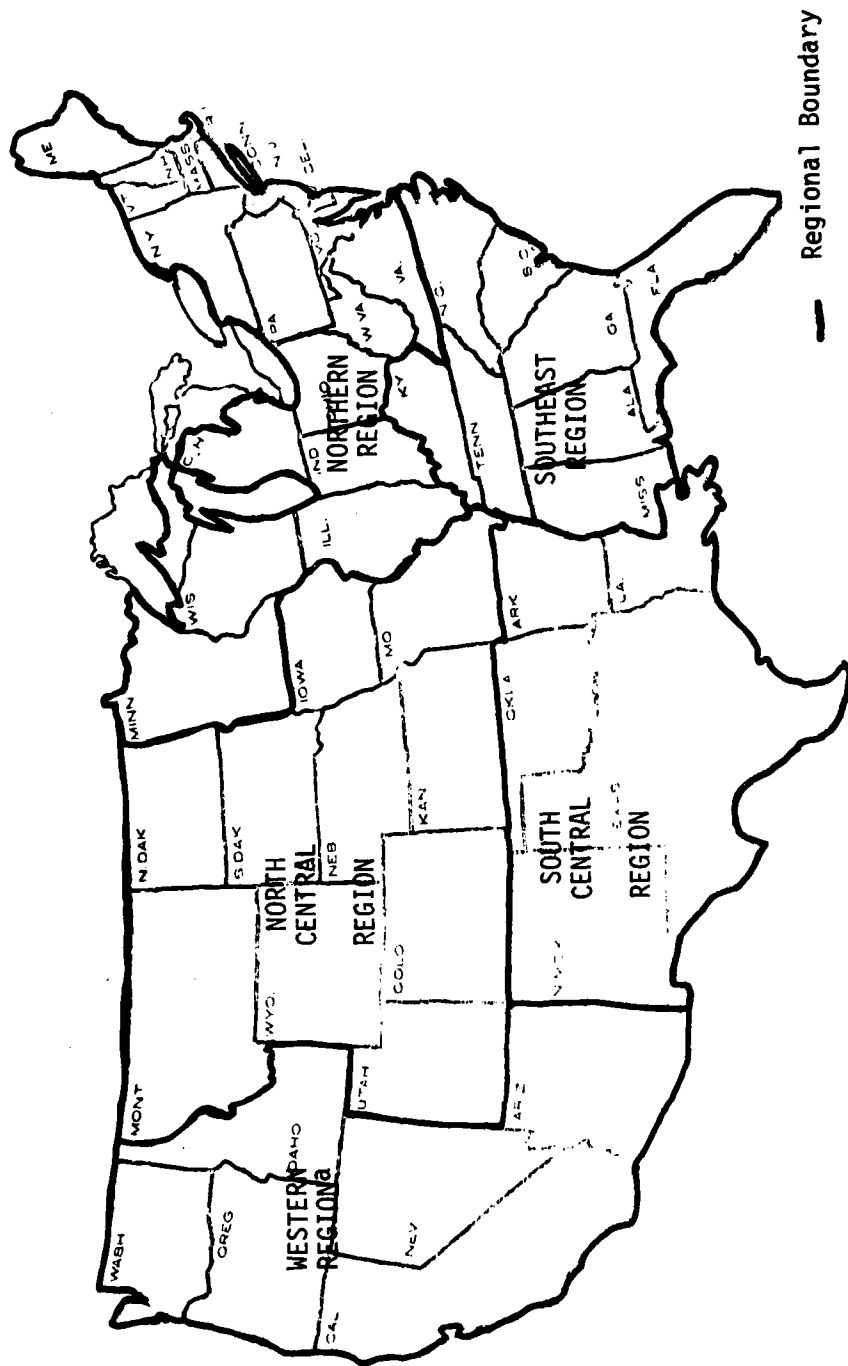
Each region is subdivided into a number of areas (Table 2-1) and each area has a veterinarian-in-charge (VIC). The VIC is the key representative for the Department of Agriculture in the investigation.

---

A3 - National Forest Service Regional Headquarters  
U.S. Department of Agriculture  
(See Figure 2-2.)

Contact this headquarters when the incident involves or threatens animals on National Forest Service land. Table 2-2 provides addresses. (Refer to Part 3, para. f, if the incident involves burros or wild horses on Forest Service land).

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<sup>a</sup>Western Region includes Alaska and Hawaii

Figure 2-1. U.S. Department of Agriculture Veterinary Services Regions

Table 2-1. U.S. Department of Agriculture Area Veterinarian-In-Charge

Region	Area	Address	Telephone
<u>Northern</u>	MA, CT, RI, ME, NH, VT	Veterinarian-in-charge USDA 424 Trapelo Rd. Waltham, MA 02154	617 839-7761
	NY, NJ, PA	Veterinarian-in-charge USDA Suite 503 80 Wolf Rd. Albany, NY 12205	518 562-4477
	MD, DE, VA, WV	Veterinarian-in-charge USDA Rm. 601, Presidential Bldg. 6525 Belcrest Dr. Hyattsville, MD 20782	301 436-8044
	OH, MI	Veterinarian-in-charge USDA 94 W. Church St. Pickerington, OH 43147	513 943-5602
	IN, IL	Veterinarian-in-charge USDA Atkinson Square W., Suite 1000 5610 Crawfordsville Rd. Indianapolis, IN 46224	317 331-6132
	MN, WI	Veterinarian-in-charge USDA 555 Wabasha St. St. Paul, MN 55102	612 725-7691
<u>Southeast</u>	TN, KY	Veterinarian-in-charge USDA P.O. Box 348 Brentwood, TN 37207	615 852-5594

(continued)

Table 2-1. U.S. Department of Agriculture Area Veterinarian-In-Charge  
(continued)

Region	Area	Address	Telephone
	MS, AL	Veterinarian-in-charge USDA P.O. Box 1120 (Milner Bldg., Rm. 400 Corner Lamar & Pearl Sts.) Jackson, MS 39205	601 490-4307
	SC, GA, NC	Veterinarian-in-charge USDA P.O. Box 11598 Columbia, SC 29211	803 677-5612
	FL, PR, VI	Veterinarian-in-charge USDA P.O. Box 400 Miami Springs, FL 33166	305 350-4733
<u>South Central</u>	OK, AR, LA	Veterinarian-in-charge USDA P.O. Box 1768 Oklahoma City, OK 73101	405 736-4335
	TX, NM	Veterinarian-in-charge USDA 702 Colorado St. Rm. 301 Austin, TX 78701	512 734-5551
<u>North Central</u>	ND, MT, SD	Veterinarian-in-charge USDA P.O. Box 639 (220 E. Rosser Ave.) Bismark, ND 58502	701 783-4211
	CO, WY, UT	Veterinarian-in-charge USDA 2490 W. 26th Ave. Rm. 237 Denver, CO 80211	303 327-3481

(continued)

Table 2-1. U.S. Department of Agriculture Area Veterinarian-In-Charge

Region	Area	Address	Telephone
	NE, KS	Veterinarian-in-charge USDA P.O. Box 81866 (300 S. 17th St.) Lincoln, NE 68501	402 867-5441
	IA, MO	Veterinarian-in-charge USDA Federal Bldg., Rm. 877 210 Walnut St. Des Moines, IA	515 862-4140
<u>Western</u>	CA, NV, AZ, HI	Veterinarian-in-charge USDA 53 Scripps Dr. Sacramento, CA 95825	916 468-5891
	WA, ID, AK, OR	Veterinarian-in-charge USDA Equitable Bldg., Suite 415 530 Center St., N.E. Salem, OR 97301	503 422-5871

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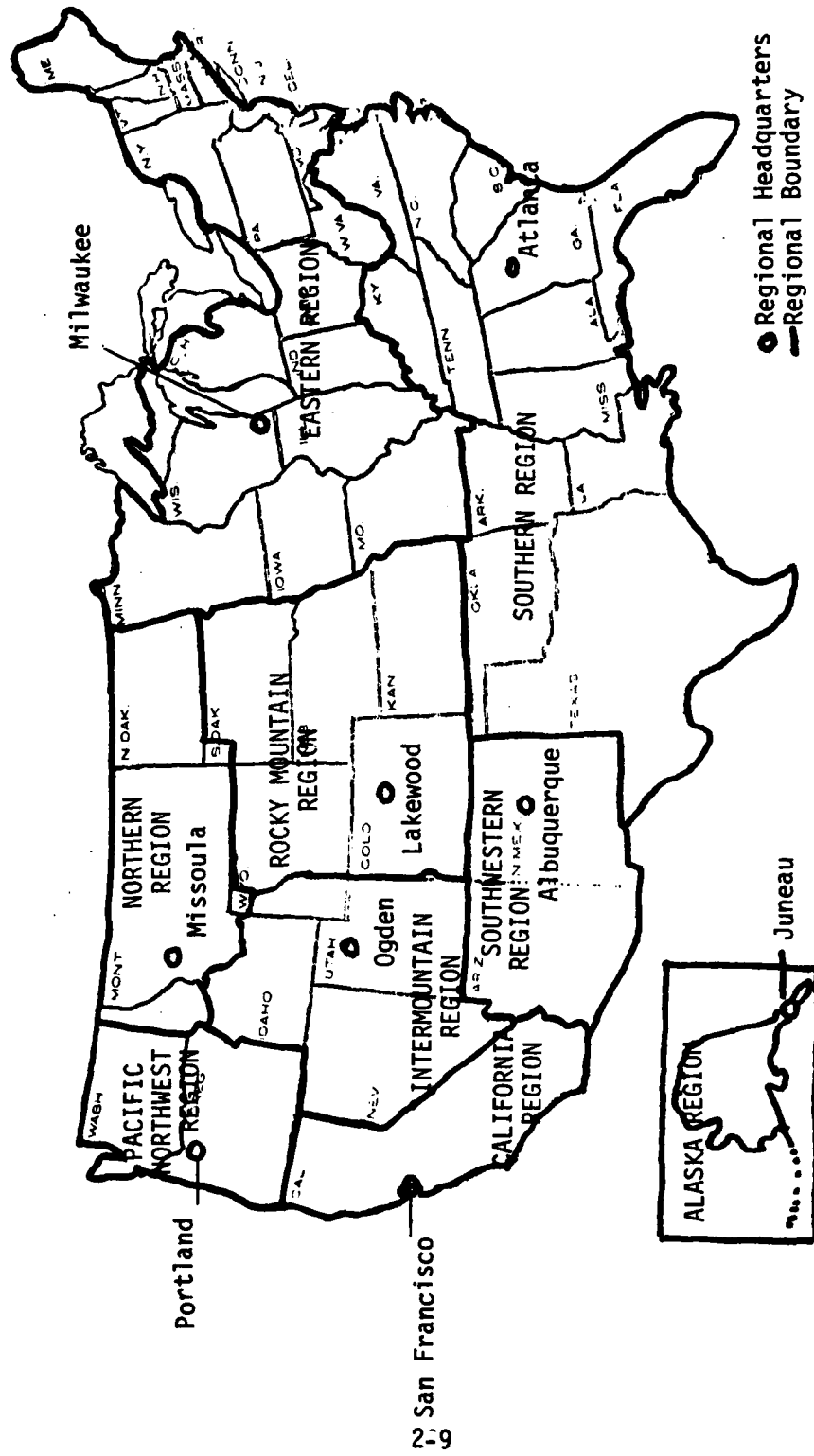


Figure 2-2. National Forest Service Regions and Headquarters.

Table 2-2. National Forest Service Regional Directors

Region	Address	Telephone
Alaska	Regional Director National Forest Service Federal Office Bldg. P.O. Box 1628 Juneau, AK 99802	907 586-7263
Northern	Regional Director National Forest Service Federal Bldg. Missoula, MT 59801	406 329-3011
Pacific Northwest	Regional Director National Forest Service 319 SW Pine St. P.O. Box 3623 Portland, OR 97208	503 221-3625
California	Regional Director National Forest Service 630 Sansome St. San Francisco, CA 94111	415 556-1932
Intermountain	Regional Director National Forest Service 324 25th St. Ogden, UT 84401	801 399-6011
Southwestern	Regional Director National Forest Service 517 Gold Ave., SW Albuquerque, NM 87102	505 474-2444
Rocky Mountain	Regional Director National Forest Service 11177 W. 8th Ave. P.O. Box 25127 Lakewood, CO 80215	303 234-3914
Eastern	Regional Director National Forest Service 633 W. Wisconsin Ave. Milwaukee, WI 53203	414 224-3693

(continued)

Table 2-2. National Forest Service Regional Directors

Region	Address	Telephone
Eastern	Regional Director National Forest Service 1720 Peachtree Rd., NW Atlanta, GA 30309	404 881-4191
(concluded)		



## INDEX C - DEPARTMENT OF COMMERCE

This department is concerned with incidents that threaten or involve commercial marine fisheries or marine mammals except for those noted in Index C1.

### Indices

C1 - Chief of Enforcement  
National Marine Fisheries Office  
National Oceanographic and Atmospheric Administration (NOAA)  
Department of Commerce  
Washington, D.C. 20235

Phone: 202 634-7529

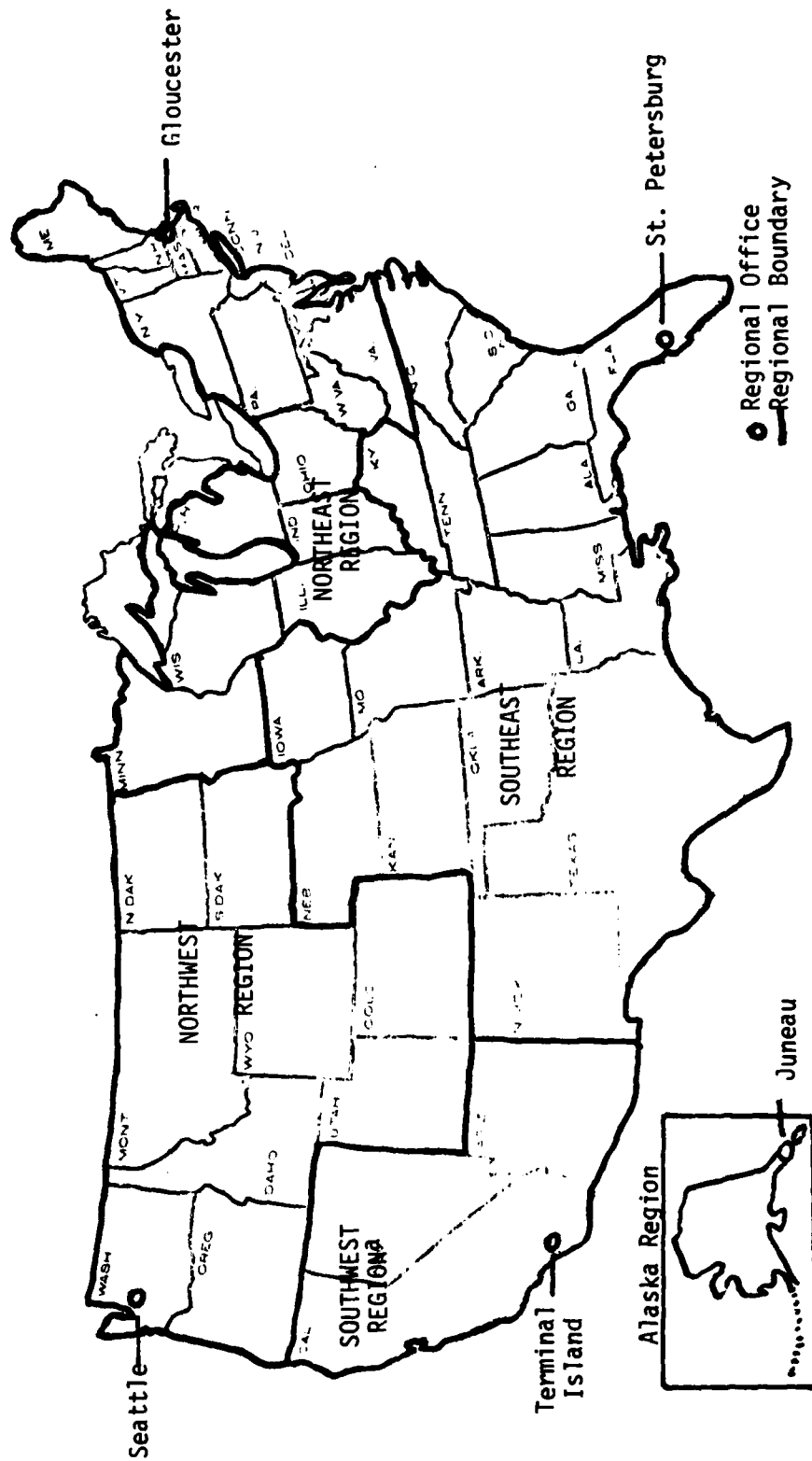
Agency concerned mainly with marine fish kills and strandings of several or more marine mammals. If incident involves marine mammals, also refer to Part 3, paragraph a. Jurisdiction covers all marine mammals except the sea otter, polar bear, walrus, dugong and manatee which are the responsibility of the Department of Interior, (refer to Index 11a).

---

C1a - Chiefs of Enforcement  
Regional Marine Fisheries Offices  
(Refer to Figure 2-3)

Table 2-3 provides addresses and phone numbers of the regional chiefs whose interests are the same as in C1. The regional chief will generally contact others in his region (private organizations, universities and volunteer groups) capable of providing assistance.

---



<sup>a</sup> Southwest Region includes Hawaii, Samoa, Guam and Trust Territories

Figure 2-3. National Marine Fisheries Service Regions and Headquarters

Table 2-3. National Marine Fisheries Regional Chiefs of Enforcement

Region	Address	Telephone
Northeast	Chief of Enforcement National Marine Fisheries Service Federal Bldg. 14 Elm St. Gloucester, MA 01930	717 281-3600
Southeast	Chief of Enforcement National Marine Fisheries Service 9450 Gandy Blvd. St. Petersburg, FL 33702	813 893-3141
Northwest	Chief of Enforcement National Marine Fisheries Service 1700 Westlake Ave. N. Seattle, WA 98109	206 442-7575
Southwest	Chief of Enforcement National Marine Fisheries Service 300 S. Ferry St. Terminal Island, CA 90731	213 548-2575
Alaska	Chief of Enforcement National Marine Fisheries Service P.O. Box 1668 Juneau, AK 99802	907 586-7221

## INDEX D - DEPARTMENT OF DEFENSE (DOD)

This department is concerned that the incident is reported to higher commands (refer to Indices D1, D2 and D3) and that DOD facilities be utilized to the fullest in the investigation (refer to D3 and D4).

### Indices

- D1 - Environmental Quality Coordinator (EQC)/Public Affairs Officer (PAO)/Judge Advocate (JA)  
Next higher command

Identities of these individuals and their telephone numbers should be known to the installation EQC, PAO and JA and should be added to the "Notes" page in Part 1. The EQC called should contact the commanding officer of his command, if appropriate.

---

- D2 - DRCPA-E  
Environmental Quality Office  
U.S. Army DARCOM  
Alexandria, VA 22333

Phone: AUTOVON 284-8122

This office should be notified because of their Command responsibility for environmental matters. They will notify the DARCOM Surgeon, General Council, Public Affairs Office, Engineer, or Command Group, if deemed appropriate.

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- D3 - DRCIS-RI-IB  
Installation Services Activity  
U.S. Army DARCOM  
Rock Island Arsenal  
Rock Island, IL 61201

Phone: AUTOVON 793-4425/4432

This organization has overall responsibility for domestic animals on property leased by DARCOM and wildlife on DARCOM installations, and may be able to provide assistance in investigating the cause of the incident. Normally, the facilities engineer (the natural resources coordinator as per AR 420-10<sup>1</sup>) should make this contact.

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<sup>1</sup>U.S. Department of the Army. Facilities Engineering General Provisions, Organization, Functions, and Personnel, AR 420-10, 15 July 1975.

## Indices

- D4 - U.S. Army Regional Veterinary Consultants  
Regional Medical Centers  
(Refer to Figure 2-4)

The veterinary consultant is the point of contact for the Health Service Command (D-4a) and probably will be able to provide assistance. Table 2-4 provides addresses.

---

- D4a - Chief of Professional Programs and  
Animal Medicine Division  
Directorate of Veterinary Services  
U.S. Army Health Services Command  
Ft. Sam Houston  
San Antonio, TX 78234

Phone: AUTOVON 471-6510/6519

The Chief of Professional Programs is the point of contact for tapping the Army's extensive capabilities for determining the cause of an incident. The Health Services Command maintains a data base of incidents of disease in wildlife and domestic animals. Normally, your installation veterinarian or surgeon would make the contact (as per AR 40-905)<sup>1</sup>.

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<sup>1</sup>U.S. Department of Army. Medical Services, Veterinary Health Services. AR 40-905, 15 October 1978.

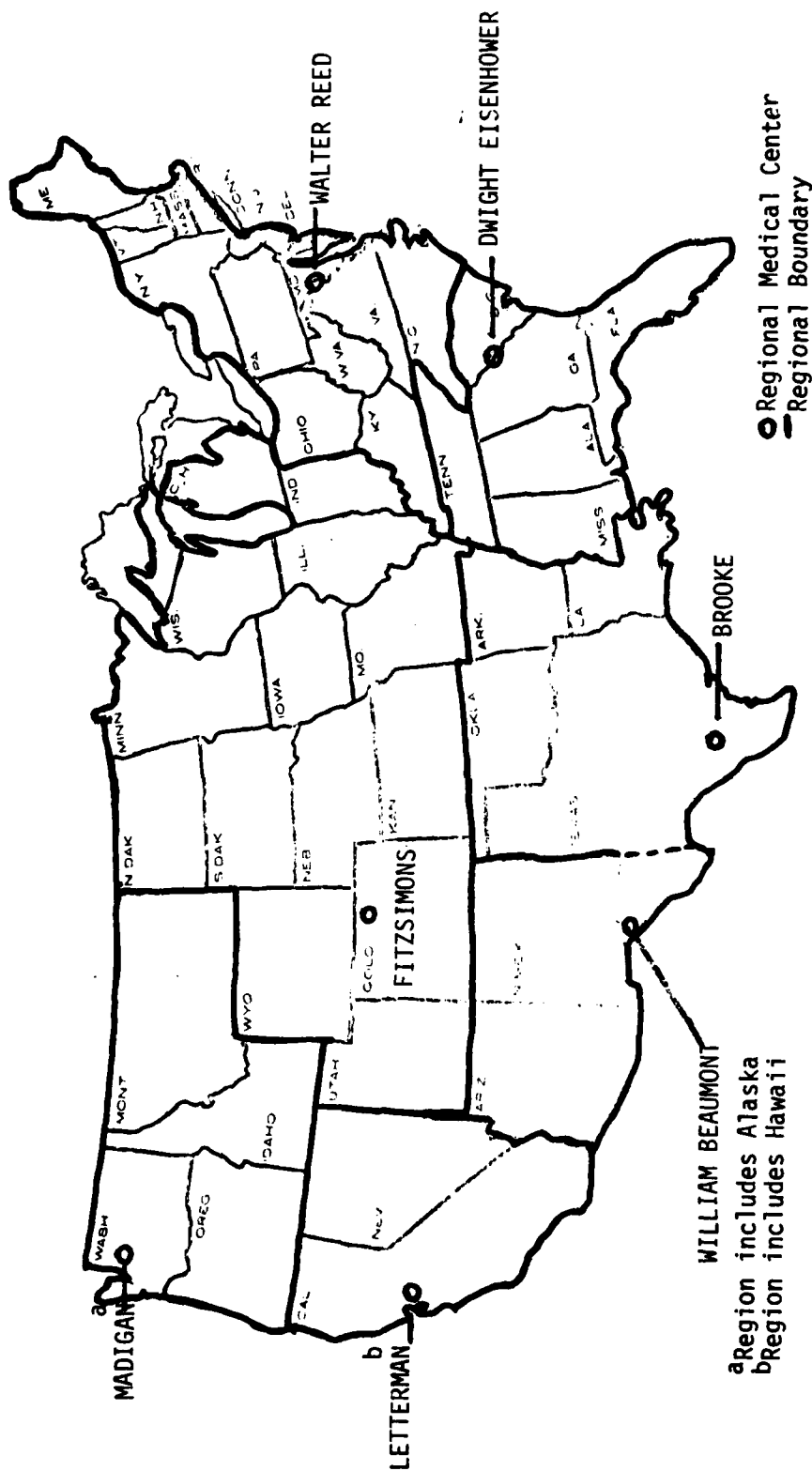


Figure 2-4. U.S. Army Regional Medical Centers

Table 2-4. U.S. Army Regional Veterinary Consultants<sup>a</sup>

Address	Telephone (Commercial)	Telephone (Autovon)
Regional Veterinary Consultant Brooke Army Medical Center Fort Sam Houston, TX 78234	512 221-2404	471-2404/5908
Regional Veterinary Consultant Dwight Eisenhower Army Medical Center Fort Gordon, GA 30330	404 752-2946	780-3564/2512
Regional Veterinary Consultant Letterman Army Medical Center Presidio of San Francisco, CA 94129	415 561-2642	586-4546/5190
Regional Veterinary Consultant Madigan Army Medical Center Fort Lewis, WA 98433	206 968-3002	357-6410/6311
Regional Veterinary Consultant Walter Reed Army Medical Center Washington, D.C. 20755	301 677-3497	291-5519/5294
Regional Veterinary Consultant William Beaumont Army Medical Center Fort Bliss, TX 79916	915 568-5702	978-5702/5706
Regional Veterinary Consultant Fitzsimons Army Medical Center Denver, CO 80240	303 341-3140	943-3140/8496

<sup>a</sup>See Figure 2-4 for area in each region

## INDEX E - ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA is concerned with all aspects of an incident except animal rescue.

### Indices

- E1 - Regional Offices  
U.S. Environmental Protection Agency  
(Refer to Figure 2-5)

Table 2-5 provides addresses. The Regional Office will assist in the investigation if the incident is severe, but in any event will assist in the clean-up.

---

- E1a - Monitoring Branch  
Office of Water Planning and Standards  
U.S. Environmental Protection Agency  
Waterside Mall Bldg.  
401 M Street SW (WH-553)  
Washington, DC 20460

Phone: 202 426-7766

This office maintains a nationwide baseline of fish kills and publishes the results annually. The office is also interested in information on incidents involving marine or aquatic invertebrates.

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- E1b - Chemical and Biological Investigations Branch  
Technical Services Division  
Biological Investigations Laboratory  
Office of Pesticides Program  
U.S. Environmental Protection Agency  
Bldg. 402 ARC E.  
Beltsville, MD 20705

Phone: 301 344-2187

This branch will assist in the investigation if a pesticide is a possible cause of the incident. The branch performs chemical and biological analyses and will send a team of investigators if the problem is major.

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## Indices

E1c - Ecological Research Laboratory  
U.S. Environmental Protection Agency  
Sabine Island  
Gulf Breeze, FL 32561

Phone: 904 932-5311

This laboratory will assist in the investigation if organic chemicals, including pesticides, are a possible cause of the incident. Major interests of the laboratory are marine and estuarine habitats.

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E1d - Ecological Research Laboratory  
U.S. Environmental Protection Agency  
S. Ferry Road  
Naragansett, RI 02882

Phone: 401 789-1071

This laboratory will assist in the investigation if the possible cause is a chemical pollutant, but especially if it is a heavy metal. Major interests of the laboratory are also marine and estuarine habitats. Damage assessment protocols are being prepared by the laboratory for oil spills in marine waters and the Great Lakes. Damage assessment protocols for other situations will be developed in the future. Contact for damage assessment is Dr. Paul Lefcourt.

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E1e - Ecological Research Laboratory  
U.S. Environmental Protection Agency  
Congdon Blvd.  
Duluth, MN 55840

Phone: 218 727-6692

This laboratory will assist in the investigation if freshwater habitats are affected.

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E1f - Ecological Research Laboratory  
U.S. Environmental Protection Agency  
200 S. 356th St.  
Corvallis, OR 97330

Phone: 503 757-4211

This laboratory will assist in the investigation if terrestrial habitats are affected.

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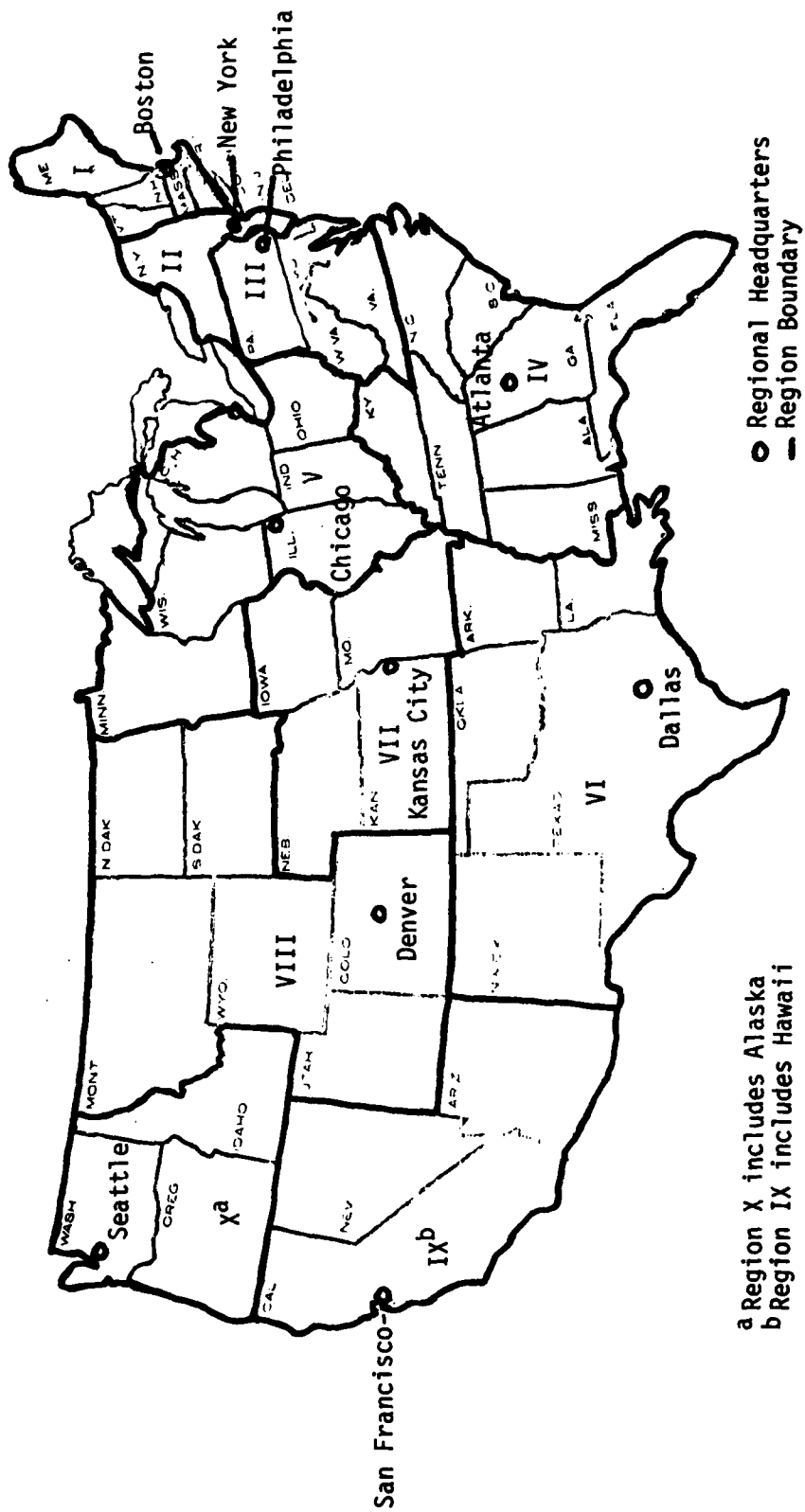


Figure 2-5. Environmental Protection Agency Regions and Headquarters

Table 2-5. Environmental Protection Agency Regional Directors

Region	Address	Telephone
I	Regional Director Environmental Protection Agency Region I, Rm. 2303 John F. Kennedy Federal Bldg. Boston, MA 02203	617 223-7265
II	Regional Director Environmental Protection Agency Region II, Rm. 908 26 Federal Plaza New York, NY 10007	201 548-8730
III	Regional Director Environmental Protection Agency Region III Curtis Bldg. 6th and Walnut Sts. Philadelphia, PA 19106	215 597-9898
IV	Regional Director Environmental Protection Agency Region IV 1421 Peachtree St., NE Atlanta, GA 30309	404 526-5062
V	Regional Director Environmental Protection Agency Region V 230 S. Dearborn St. Chicago, IL 60604	312 896-7591
VI	Regional Director Environmental Protection Agency Region VI, Suite 1000 1600 Patterson St. Dallas, TX 75201	214 749-3340
VII	Regional Director Environmental Protection Agency Region VII 1735 Baltimore Ave. Kansas City, MO 64108	816 374-3776

(continued)

Table 2-5. Environmental Protection Agency Regional Directors

Region	Address	Telephone
VIII	Regional Director Environmental Protection Agency Region VIII, Suite 900 1860 Lincoln St. Denver, CO 80203	303 837-3880
IX	Regional Director Environmental Protection Agency Region IX 100 California St. San Francisco, CA 94111	415 556-6254
X	Regional Director Environmental Protection Agency Region X 1200 6th Ave. Seattle, WA 98101	206 442-4343

(concluded)

INDEX H - DEPARTMENT OF HEALTH, EDUCATION AND WELFARE (HEW)

This department is concerned if the incident threatens human health.

Indices

H1 - Office of the Director  
Center for Disease Control (CDC)  
Public Health Service  
U.S. Department of Health, Education and Welfare  
Atlanta, GA 30333

Phone: 404 633-3311

CDC will become involved if the disease or toxic chemical has an implication for human health. The investigative agencies within CDC are diverse and the identification of the proper agency will have to be made at the time of the incident by CDC personnel. CDC maintains a data base of incidents of zoonoses (diseases transmissible under natural conditions from vertebrate animals to man<sup>1</sup>).

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<sup>1</sup>Definition from: American Public Health Association, Control of Communicable Diseases in Man, Abram S. Beneson (ed.), 1975.

## INDEX I - DEPARTMENT OF THE INTERIOR

This department is concerned with incidents that threaten or involve nationally and internationally protected species<sup>1</sup> of fish, game and wildlife, but is not concerned with resident (state) game species (refer to Index S). The department is also concerned with incidents involving or threatening wildlife on certain lands (refer to Indices I2, I3, I4, I5 and I6).

### Indices

- I1 - Area Managers  
U.S. Fish and Wildlife Service  
(Refer to Figure 2-6 and Table 2-6)

An area manager will provide assistance if the incident threatens or involves fish, game or wildlife.<sup>2,3,4,5,6</sup>

---

- I1a - Division of Law Enforcement  
U.S. Fish and Wildlife Service  
Washington, DC 20240

Phone: 202 343-9242

The law enforcement division must be notified within 5 days when the animal involved in the incident is an endangered or threatened species or a species protected by Federal Law (Volume 2).<sup>4</sup> The Department of Interior solicitors (lawyers) provide the majority of legal guidance for the Department of the Interior agencies.<sup>2,3,4,6</sup>

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<sup>1</sup>Protected species include those animals whose taking is regulated by federal statutes (refer to Part 3).

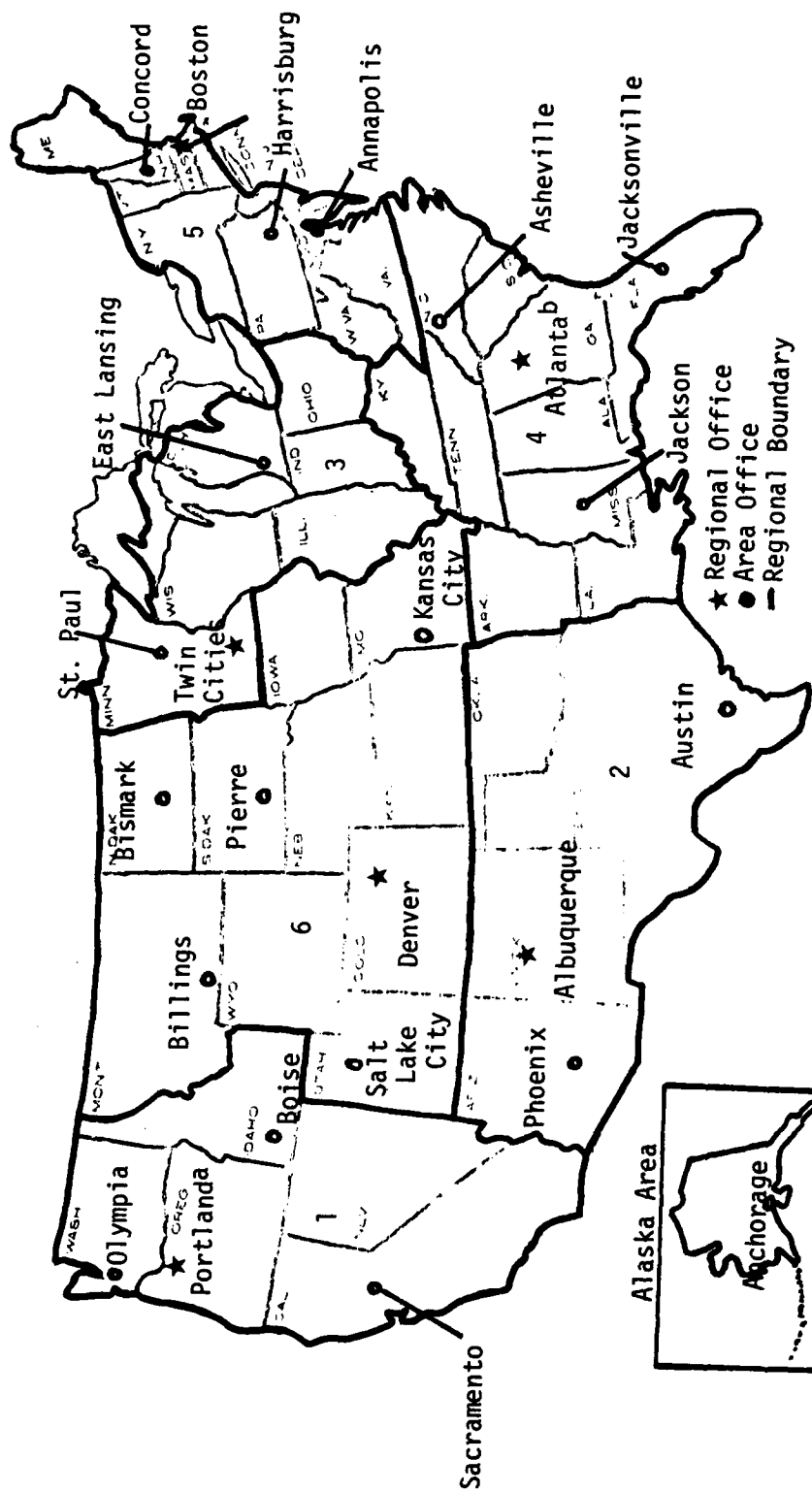
<sup>2</sup>Refer to Part 3, paragraph a, if incident involves marine animals.

<sup>3</sup>Refer to Part 3, paragraph b, if incident involves native birds.

<sup>4</sup>Refer to Part 3, paragraph c, if incident involves endangered or threatened species.

<sup>5</sup>Refer to Part 3, paragraph d, if incident is caused by a discharge of oil or hazardous substances.

<sup>6</sup>Refer to Part 3, paragraph e, if incident involves a bald or golden eagle.



a Region includes Hawaii    b Region includes Puerto Rico and Virgin Islands

Figure 2-6. U.S. Fish and Wildlife Service Regions and Headquarters

Table 2-6. U.S. Fish and Wildlife Service Regional Directors and Area Managers

Region	Area	Address	Telephone
<u>Pacific</u>	Region 1	Regional Director U.S. Fish and Wildlife Service Suite 1692, Lloyd Bldg. 500 N.E. Mulnomah St. Portland, OR 97232	503 231-6118
	California Nevada	Area Manager U.S. Fish and Wildlife Service Rm. E-2911, Federal Bldg. 2800 Cottage Way Sacramento, CA 95825	916 484-4664
	Idaho Oregon	Area Manager U.S. Fish and Wildlife Service 4620 Overland Rd. Boise, ID 83705	208 384-1947
	Washington	Area Manager U.S. Fish and Wildlife Service Bldg. "A" 2625 Parkmont Lane Olympia, WA 98502	206 753-9578
	Hawaii	Hawaii Administrator U.S. Fish and Wildlife Service Rm. 507 1311 Kapiolani Blvd. Honolulu, HI 96814	808 546-5608
<u>Southwest</u>	Region 2	Regional Director U.S. Fish and Wildlife Service P.O. Box 1306 Albuquerque, NM 87103	505 766-2321
	Arizona New Mexico	Area Manager U.S. Fish and Wildlife Service Suite 704, Americo Towers Bldg. 2721 N. Central Ave. Phoenix, AZ 85004	602 261-3656

(continued)



Table 2-6. U.S. Fish and Wildlife Service Regional Directors and Area Managers  
(continued)

Region	Area	Address	Telephone
<u>Southwest</u>	Oklahoma Texas	Area Manager U.S. Fish and Wildlife Service Rm. 327-328 U.S. Custom House Galveston, TX 77551	713 763-1211
<u>North Central</u>	Region 3	Regional Director U.S. Fish and Wildlife Service Federal Building, Fort Snelling Twin Cities, MN 55111	612 725-3500
	Indiana Michigan Ohio	Area Manager U.S. Fish and Wildlife Service 217 Manly Miles Bldg. 1405 S. Harrison Rd. East Lansing, MI 48823	517 372-1910
	Illinois Minnesota Wisconsin	Area Manager U.S. Fish and Wildlife Service c/o Regional Office Twin Cities, MN	612 725-3504
<u>Southeast</u>	Region 4	Regional Director U.S. Fish and Wildlife Service P.O. Box 95067 Atlanta, GA 30347	404 881-4671
	Florida Georgia Puerto Rico Virgin Islands	Area Manager U.S. Fish and Wildlife Service 325 Holly Knowe Rd. Orange Park, FL 32073	904 264-9574
	Alabama Arkansas Louisiana Mississippi	Area Manager U.S. Fish and Wildlife Service Suite 490 Providence Capitol Bldg. 200 E. Pascagoula St. Jackson, MS 39201	601 469-4900

(continued)

Table 2-6. U.S. Fish and Wildlife Service Regional Directors and Area Managers  
(continued)

Region	Area	Address	Telephone
	Kentucky North Carolina South Carolina Tennessee	Area Manager U.S. Fish and Wildlife Service P.O. Box 1288 Main Post Office Station Asheville, NC 28802	704 877-3121
<u>Northeast</u>	Region 5	Regional Director U.S. Fish and Wildlife Service Suite 700 One Gateway Center Newton Corner, MA 02158	617 965-5100
	Delaware Maryland Virginia	Area Manager U.S. Fish and Wildlife Service 1825B Virginia St. Annapolis, MD 24401	301 269-5448
	Connecticut Maine Vermont Massachusetts New Hampshire Rhode Island	Area Manager U.S. Fish and Wildlife Service P.O. Box 1518 Concord, NH 03301	603 224-9558
	New Jersey New York Pennsylvania West Virginia	Area Manager U.S. Fish and Wildlife Service 1500 N. 2nd St. Harrisburg, PA 17102	717 782-3743
<u>Northwest</u>	Region 6	Regional Director U.S. Fish and Wildlife Service P.O. Box 25486 Denver Federal Center Denver, CO 80225	303 234-2209
	Montana Wyoming	Area Manager U.S. Fish and Wildlife Service Rm. 3035 Federal Bldg. 316 N. 26th St. Billings, MT 59101	406 657-6360

(continued)

Table 2-6. U.S. Fish and Wildlife Service Regional Directors and Area Managers

Region	Area	Address	Telephone
<u>Northwest</u>	North Dakota	Area Manager U.S. Fish and Wildlife Service P.O. Box 1897 Bismark, ND 58501	701 255-4011
	Iowa Kansas Missouri	Area Manager U.S. Fish and Wildlife Service Rm. 1748, Federal Bldg. 601 E. 12th St. Kansas City, MO 64106	816 374-6166
	Nebraska South Dakota	Area Manager U.S. Fish and Wildlife Service P.O. Box 250 Pierre, SD 57501	605 224-8692
	Colorado Utah	Area Manager U.S. Fish and Wildlife Service Rm. 1426, Federal Bldg. 125 S. State St. Salt Lake City, UT 84138	801 524-5630
<u>Alaska</u>	Alaska Area	Area Manager U.S. Fish and Wildlife Service 1101 E. Tudor Rd. Anchorage, AK 99501	907 265-4864

(concluded)

## Indices

11b - Director  
Department of Veterinary Science  
National Fish and Wildlife Health Laboratory (NFWH Laboratory)  
U.S. Fish and Wildlife Service  
1606 Mineral Point Rd.  
Madison, WI 53705

Phone: 608 252-5422

This laboratory performs analyses on tissues collected in the field and will send a disease diagnostician or epidemiologist if the incident is of interest to them. The laboratory covers: field investigations in either acute or chronic wildlife disease problems, gross and microscopic pathology, bacteriology, virology, parasitology and toxicology. Toxicological specimens are forwarded by the Department of Veterinary Science to the Patuxent Wildlife Research Center (11c).

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11c - Patuxent Wildlife Research Center  
U.S. Fish and Wildlife Service  
U.S. Department of the Interior  
Laurel, MD 20811

Phone: 301 776-4880

The Patuxent Center will analyze toxicology samples after they have been processed through the NFWH Laboratory (11b).

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11d - Fish Disease Laboratory  
U.S. Fish and Wildlife Service  
Leetown, Rt. 1, P.O. Box 17A  
Kearneysville, WV 25430

Phone: 304 724-8481

The disease laboratory will perform studies on tissues to determine whether a pathogen was the causative agent of a fish kill, if the incident is of an unusual nature.

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## Indices

- Ile - Hatchery Biologist Program  
U.S. Fish and Wildlife Service  
(Refer to Table 2-7)

Fish disease diagnosticians in the program will provide diagnostic service for routine fish kills.

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- I2 - Bureau of Outdoor Recreation  
U.S. Department of the Interior  
Washington, DC 20240

Phone: 202 343-5726

Contact the bureau if the incident involves or threatens a wild and scenic river (see Figure 2-7). Refer to Section A.2.c.(2) of Volume 2 for additional information.

---

- I3 - Director, State Offices  
Bureau of Land Management (BLM)  
U.S. Department of the Interior  
(Refer to Table 2-8)

Contact the state office if the incident involves wild burros or horses that range onto BLM or other public lands (refer to Part 3, paragraph f) or if it involves or threatens wildlife or domestic animals on BLM property. The state office will assist in the investigation of cause. Refer to Section B.1.a. of Volume 2 for additional information.

---

- I4 - Regional Offices  
National Park Service  
U.S. Department of the Interior  
(Refer to Figure 2-8 and Table 2-9)

Contact the Regional Office when the incident involves or threatens a national park. Refer to Section B.1.a. of Volume 2 for additional information.

---

Table 2-7. U.S. Fish and Wildlife Service Fish Hatchery Biologists

Region	Address	Telephone
<u>1</u>	Fish Hatchery Biologist U.S. Fish and Wildlife Service Dworshak Station P.O. Box 251 Ahsahka, ID 83520	208 476-4591
	Fish Hatchery Biologist U.S. Fish and Wildlife Service Abernathy Station 1440 Abernathy Rd. Longview, WA 98632	206 425-6072
	Fish Hatchery Biologist U.S. Fish and Wildlife Service Little White Salmon Station P.O. Box 17 Cook, WA 98605	509 538-2755
<u>2</u>	Fish Hatchery Biologist U.S. Fish and Wildlife Service San Marcos Station San Marcos, TX 78666	512 392-0983
<u>3</u>	Fish Hatchery Biologist U.S. Fish and Wildlife Service Genoa Station P.O. Box 252 Genoa, WI 54632	608 689-2730
<u>4</u>	Fish Hatchery Biologist U.S. Fish and Wildlife Service Greers Ferry Station P.O. Box 296 Rt. 4 Heber Springs, AR 72543	501 362-6038
	Fish Hatchery Biologist U.S. Fish and Wildlife Service Pisgah Forest Station P.O. Box 158 Pisgah Forest, NC 28768	704 877-3122

(continued)

Table 2-7. U.S. Fish and Wildlife Service Fish Hatchery Biologists

Region	Address	Telephone
<u>5</u>	Fish Hatchery Biologist U.S. Fish and Wildlife Service Leetown Station Kearneysville, WV 25430	304 725-7904
	Fish Hatchery Biologist U.S. Fish and Wildlife Service State Fish Hatchery East Street Belchertown, MS 01007	413 323-4593
	Fish Hatchery Biologist U.S. Fish and Wildlife Service Craig Brook Station East Orland, ME 04431	207 469-7300
<u>6</u>	Fish Hatchery Biologist U.S. Fish and Wildlife Service Fort Morgan Station P.O. Box 917 Fort Morgan, CO 80701	303 867-9474

(concluded)





Table 2-8. Bureau of Land Management State Directors

State	Address	Telephone
Alaska	Director BLM State Office 555 Cordova St. Anchorage, AK 99501	907 277-1561
Arizona	Director BLM State Office 2400 Valley Bank Center Phoenix, AZ 85073	602 261-3873
California	Director BLM State Office Rm. E-2841, Federal Bldg. 2800 Cottage Way Sacramento, CA 95825	916 484-4676
Colorado	Director BLM State Office Rm. 700, Colorado State Bldg. 1600 Broadway Denver, CO 80202	303 837-4325
Eastern states office	Director BLM State Office 7981 Eastern Ave. Silver Spring, MD 20910	301 427-7500
Idaho	Director BLM State Office Rm. 398, Federal Bldg. 550 W. Fort St. P.O. Box 42 Boise, ID 83724	208 342-2401
Montana	Director BLM State Office Granite Tower 222 N. 32nd St. P.O. Box 30157 Billings, MT 59107	406 245-6462

(continued)

Table 2-8. Bureau of Land Management State Directors

State	Address	Telephone
Nevada	Director BLM State Office Rm. 3008, Federal Bldg. 300 Booth St. Reno, NV 89502	702 784-5451
New Mexico	Director BLM State Office U.S. Post Office and Federal Bldg. S. Federal Place P.O. Box 1449 Santa Fe, NM 87501	505 988-6217
Oregon	Director BLM State Office 729 N.E. Oregon St. P.O. Box 2965 Portland, OR 97208	503 234-3361
Utah	Director BLM State Office Federal Bldg. 125 S. State P.O. Box 11505 Salt Lake City, UT 84147	801 524-5311
Wyoming	Director BLM State Office Joseph C. O'Mahoney Federal Center 2120 Capitol Ave. P.O. Box 1828 Cheyenne, WY 82001	307 778-2326

(concluded)

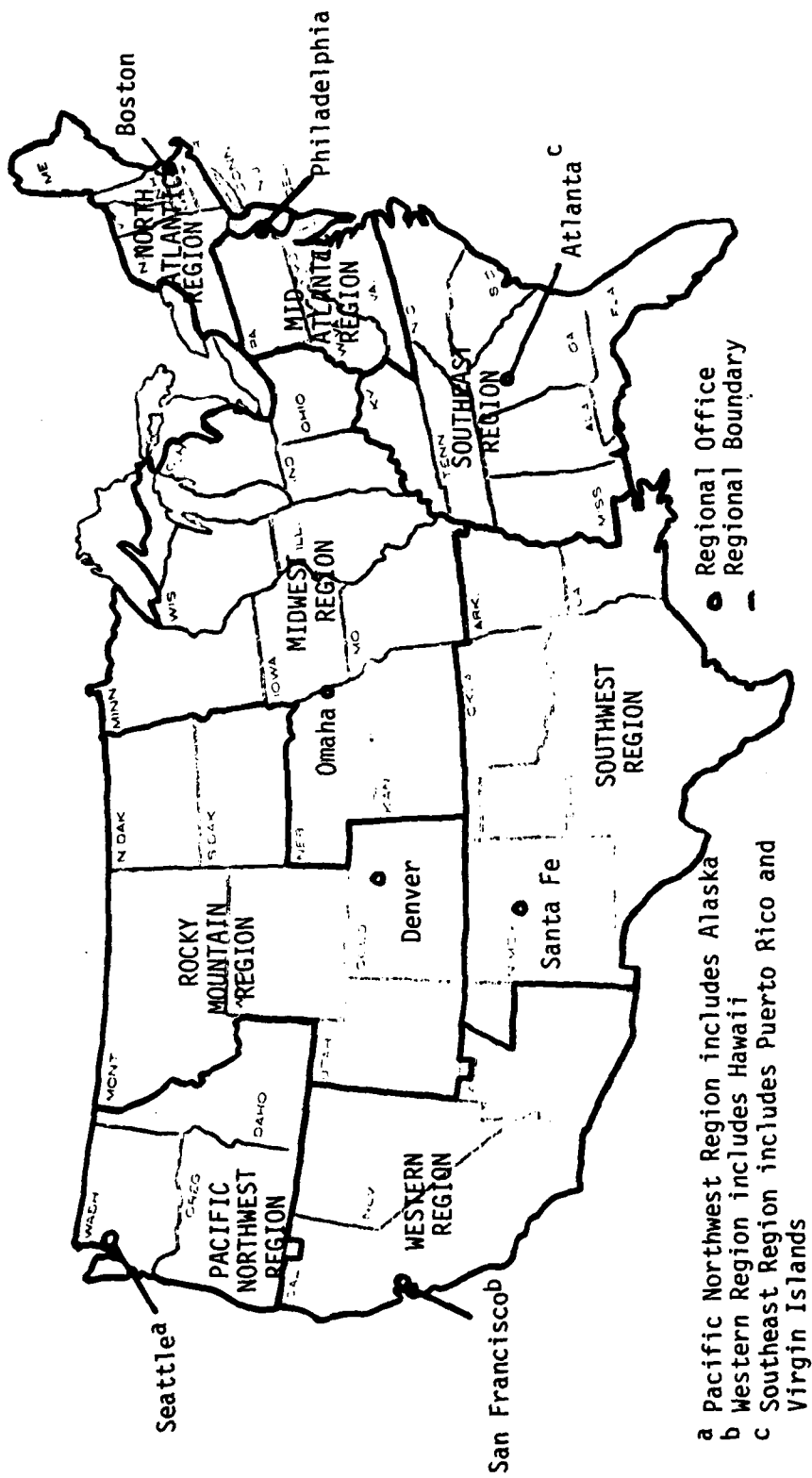


Figure 2-8. National Park Service Regions and Headquarters

Table 2-9. National Park Service Regional Directors

Region	Address	Telephone
North Atlantic	Regional Director National Park Service 15 State St. Boston, MA 02109	617 223-3769
Mid Atlantic	Regional Director National Park Service 143 S. Third St. Philadelphia, PA 19106	215 597-7013
Southeast	Regional Director National Park Service 1895 Phoenix Blvd. Atlanta, GA 30349	404 996-2520
Midwest	Regional Director National Park Service 1709 Jackson St. Omaha, NB 68102	402 221-3431
Rocky Mountain	Regional Director National Park Service P.O. Box 25287 Denver, CO 80225	303 234-2500
Southwest	Regional Director National Park Service Old Santa Fe Trail P.O. Box 728 Santa Fe, NM 87501	505 988-6388
Western	Regional Director National Park Service 450 Golden Gate Ave. P.O. Box 36063 San Francisco, CA 94102	415 556-4196
Pacific Northwest	Regional Director National Park Service Rm. 922, 4th and Pike Bldg. 1424 Fourth Ave. Seattle, WA 98101	206 442-5565

## Indices

- I5 - Regional Directors  
Bureau of Reclamation  
U.S. Department of the Interior  
(Refer to Figure 2-9 and Table 10)

Contact the Regional Director when the incident involves or threatens a Bureau of Reclamation project. Refer to Section B.1.a. of Volume 2 for additional information.

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- I6 - Area Offices  
Bureau of Indian Affairs  
U.S. Department of the Interior  
Table 11

Contact the Area Office when the incident involves or threatens animals on Indian reservations. Refer to Section A.2.f.(1) of Volume 2 for additional information.

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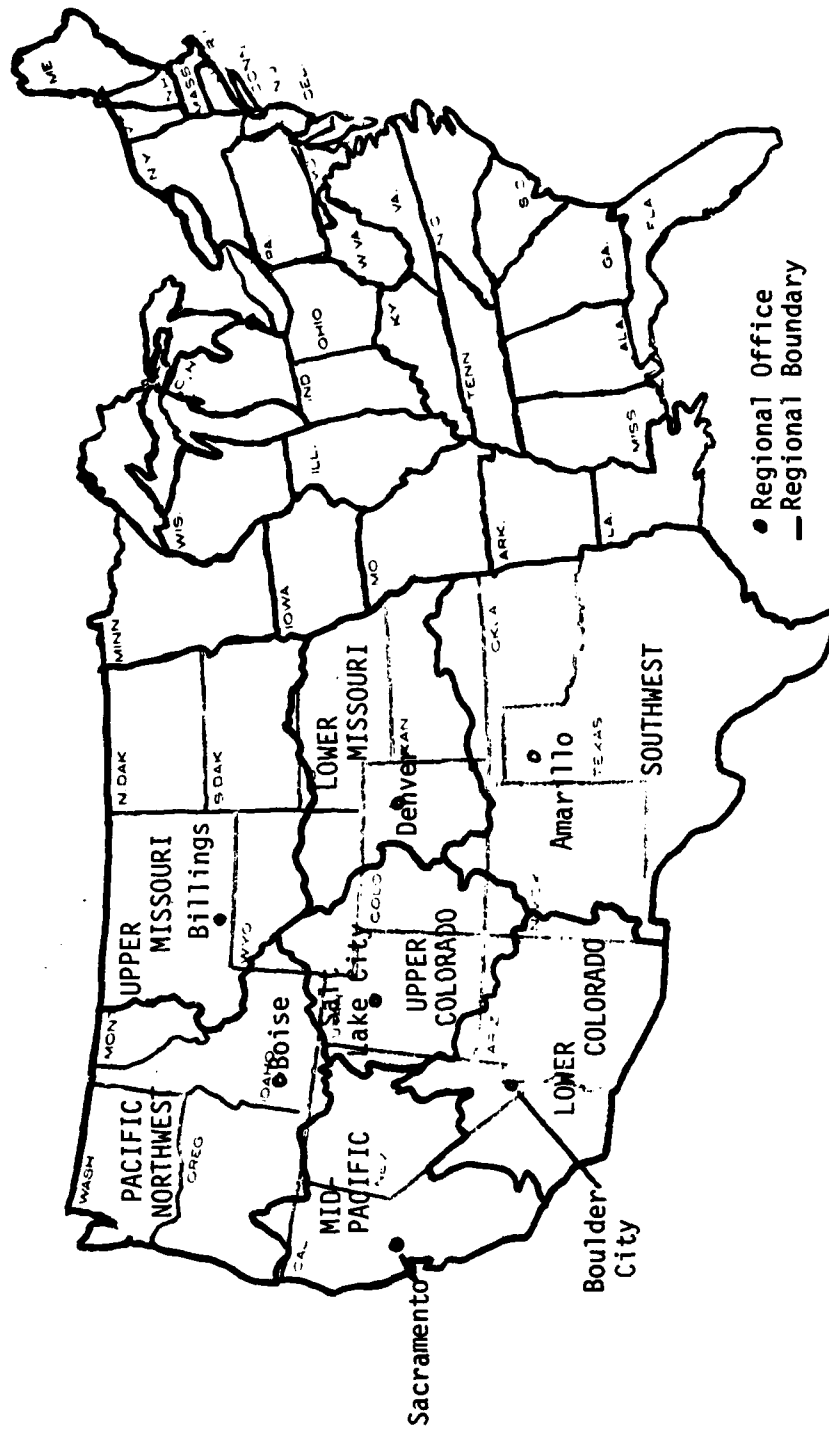


Figure 2-9. Bureau of Reclamation Regions and Headquarters

Table 2-10. Bureau of Reclamation Regional Directors

Region	Address	Telephone
Pacific Northwest	Director Bureau of Reclamation Federal Bldg. and U.S. Courthouse P.O. Box 043-550 Fort St. Boise, ID 83724	208 384-1905
Mid-Pacific	Director Bureau of Reclamation Federal Bldg. 2800 Cottage Way Sacramento, CA 95825	916 484-4571
Lower Colorado	Director Bureau of Reclamation P.O. Box 427 Admin. Bldg. Boulder City, NV 89005	702 293-2161
Upper Colorado	Director Bureau of Reclamation P.O. Box 11568 125 S. State St. Salt Lake City, UT 84147	801 524-5592
Southwest	Director Bureau of Reclamation Herring Plaza P.O. Box H-4377 Amarillo, TX 79101	806 376-2401
Upper Missouri	Director Bureau of Reclamation P.O. Box 2553 Federal Bldg. 316 N. 26th St. Billings, MT 59103	406 657-6214
Lower Missouri	Director Bureau of Reclamation Bldg. 20 Denver Federal Center Denver, CO 80225	303 234-4441

Table 2-11. Bureau of Indian Affairs Area Directors

Area Office	States	Address	Telephone
Aberdeen	NE, ND, SD	Area Director Bureau of Indian Affairs 115 4th Ave. S.E. Federal Bldg. Aberdeen, SD 57401	605 225-0250
Albuquerque	CO, NM	Area Director Bureau of Indian Affairs 5301 Central Ave. N.E. P.O. Box 8327 Albuquerque, NM 87108	505 766-3170
Anadarko	KS, OK	Area Director Bureau of Indian Affairs Federal Bldg. P.O. Box 368 Anadarko, OK 73005	405 247-6673
Billings	MT, WY	Area Director Bureau of Indian Affairs 316 N. 26th St. Billings, MT 59101	406 657-6315
Eastern	NY, NC, LA MS, FL	Area Director Bureau of Indian Affairs 1951 Constitution Ave. N.W. Washington, DC 20245	202 343-5582
Juneau	AK	Area Director Bureau of Indian Affairs Federal Bldg. P.O. Box 3-8000 Juneau, AK 99801	907 586-7177
Minneapolis	MN, IA, MI WI	Area Director Bureau of Indian Affairs 831 2nd Ave. S. Minneapolis, MN 55402	612 725-2904

(continued)



Table 2-11. Bureau of Indian Affairs Area Directors

Area Office	States	Address	Telephone
Muskogee	OK	Area Director Bureau of Indian Affairs Federal Bldg. Muskogee, OK 74401	918 687-2295
Navajo	AZ, UT, NM	Area Director Bureau of Indian Affairs Window Rock, AZ 86515	602 871-4368
Phoenix	AZ, NV	Area Director Bureau of Indian Affairs 3030 N. Central Ave. P.O. Box 7007 Phoenix, AZ 85011	602 261-4101
Portland	OR, WA, ID	Area Director Bureau of Indian Affairs 1425 Irving St. N.E. P.O. Box 3785 Portland, OR 97208	503 234-3361
Sacramento	CA	Area Director Bureau of Indian Affairs Federal Office Bldg. 2800 Cottage Way Sacramento, CA 95825	916 484-4682

(concluded)

## INDEX T - DEPARTMENT OF TRANSPORTATION

This department is concerned with spills of oil or hazardous materials and the rescue of stranded marine mammals. Refer to Part 3, paragraph d, if the incident involves a discharge of oil or a hazardous substance.

### Indices

- T1 - District Headquarters  
U.S. Coast Guard  
(Refer to Figure 2-10 and Table 2-12)

District headquarters will assist in the rescue of large marine mammals by towing them back to sea. If the spill occurs in marine waters or on the Great Lakes the Coast Guard will assist in the clean up.

- 
- T1a - National Response Center (NRC)  
Headquarters, U.S. Coast Guard  
Department of Transportation  
Washington, DC 20590

Phone: 202 426-9568

The NRC is the headquarters for the National Response Team (NRT) created under the National Oil and Hazardous Substances Pollution Contingency Plan (refer to Part 3, paragraph d). The NRT is comprised of primary agencies from Department of Transportation, Defense, Commerce and Interior, and EPA as well as advisory agencies representing state and federal interests. Regional Response Teams [equivalent to EPA regions and available through EPA Regional Office (E1)] are available to respond to all activities associated with a spill into water of an oil or a hazardous substance.

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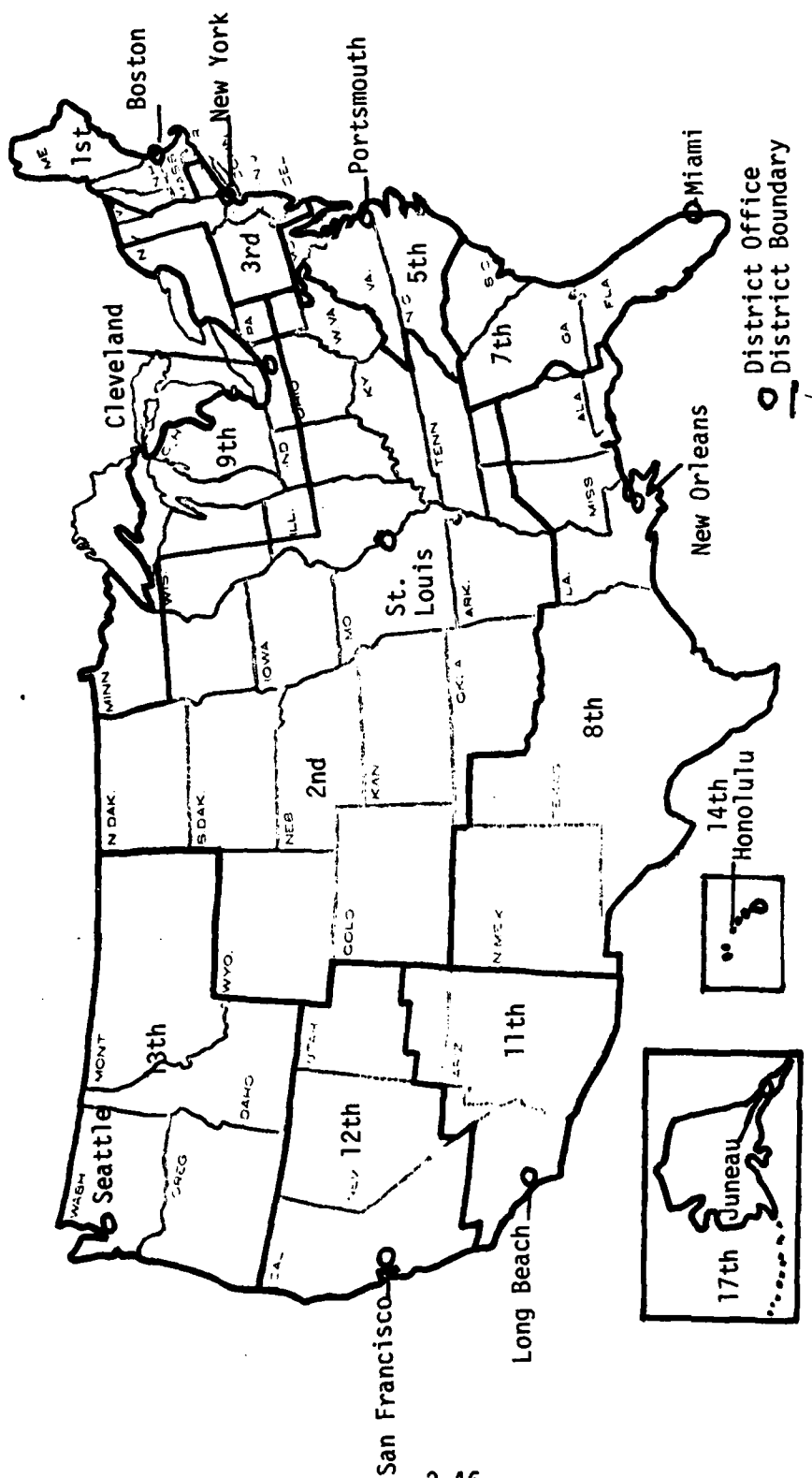


Figure 2-10. U.S. Coast Guard Regions and Headquarters

Table 2-12. U.S. Coast Guard District Commanders

District	Address	Telephone (Duty Officer)
1st	District Commander U.S. Coast Guard 150 Causeway St. Boston, MA 02114	617 223-6650
2nd	District Commander U.S. Coast Guard Federal Bldg. 1520 Market St. St. Louis, MO 63101	314 622-4614
3rd	District Commander U.S. Coast Guard Governors Island New York, NY 10004	212 264-4800
5th	District Commander U.S. Coast Guard Federal Bldg. 431 Crawford St. Portsmouth, VA 23705	703 393-9611
7th	District Commander U.S. Coast Guard Rm. 1018, Federal Bldg. 51 S.W. 1st Ave. Miami, FL 33130	305 350-5611
8th	District Commander U.S. Coast Guard Customhouse New Orleans, LA 70130	504 527-6225
9th	District Commander U.S. Coast Guard 1240 E. 9th St. Cleveland, OH 44199	216 522-3984

(continued)

Table 2-12. U.S. Coast Guard District Commanders

District	Address	Telephone (Duty Officer)
11th	District Commander U.S. Coast Guard Heartwell Bldg. 19 Pine Ave. Long Beach, CA 90802	213 590-2311
12th	District Commander U.S. Coast Guard 630 Sansome St. San Francisco, CA 94126	415 556-5500
13th	District Commander U.S. Coast Guard 618 2nd Ave. Seattle, WA 98104	206 524-2902
14th	District Commander U.S. Coast Guard 677 Ala Moana Blvd. Honolulu, HI 96813	808 546-7109
17th	District Commander U.S. Coast Guard P.O. Box 3-5000 Juneau, AK 99801	907 586-7340

(concluded)

## INDEX S - STATE AGENCIES

Contact state agencies when the incident involves or threatens either wildlife or resident game species (refer to Index S1) or livestock or human health (refer to Index S2).

### Indices

S1 - State Fish and Game Department or its equivalent will provide assistance in rescue efforts, the investigation of the cause and clean up. Furthermore, coastal states are required to file a semi-annual report to the Secretary of Commerce describing their activities involving disposal of marine carcasses.

---

S2 - State Department of Health or its equivalent will provide assistance when human health or livestock are threatened.

## INDEX P - PRIVATE SECTOR

Notification of elements of the private sector will be accomplished in accordance with installation policy (refer to Indices P1, P2 and P5). Elements of the private sector will also be identified when additional specialized support is required (refer to Indices P1, P2, P3, P4, P6 and P7).

### Indices

- P1 - Director  
Atlantic and Gulf Coast Beached Bird Survey Project  
1701 E. Harbor View Rd.  
P.O. Box 52  
Charlotte Harbor, FL 33950

Phone: 813 629-2656

The project maintains a baseline of beached birds on the Gulf of Mexico and the Atlantic coast from southern Florida to Cape Cod. Project personnel may be able to provide assistance in the counting of beached birds.

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- P2 - Director  
Point Reyes Bird Observatory  
4990 Shoreline Highway  
Stinson Beach, CA 94970

Phone: 415 663-1093

The observatory maintains a baseline of beached birds and mammals on the Pacific coast from the Mexico-California border to the Washington-Oregon border. Observatory personnel may be able to provide assistance in counting of beached birds.

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- P3 - Petroleum Industries' Referral Service  
Available through:  
Environmental Protection Agency  
Regional Office (E1)

The Petroleum Industries will assist in clean-up if a petroleum product is involved.

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## Indices

- P4 - International Bird Rescue  
Aquatic Park  
Berkeley, CA 94710

Phone: 415 841-9086

The rescue organization is primarily experienced in oil spills, but is also interested in helping to rescue birds when other pollutants are involved. Assistance is supervisory in nature. The organization has a program to train individuals in bird rescue and this program is recommended if oiled birds are frequently encountered.

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- P5 - Center for Short-Lived Phenomena  
129 Mt. Auburn Street  
Cambridge, MA 02138

Phone: 617 492-3310

An international clearing house, primarily for scientists, for the rapid receipt and dissemination of information about natural and man-caused events. The center draws on a global reporting network to record and research unpredictable, unexpected and sudden events such as pollution incidents (also covers volcanic eruptions, earthquakes, meteorite falls and others). Some of approximately 2300 correspondents in more than 140 countries may be available to assist in the investigation.

---

- P6 - Private individuals, corporations, local and state government agencies and others not covered elsewhere, but whose interests are threatened by the incident. These should be identified by the installation Public Affairs Office and included in the installation EIA (refer to Volume 2).
-



## Indices

- P7 - Local chapters of the National Audubon Society, Sierra Club, Friends of the Earth, the Humane Society<sup>1</sup>, and the National Wildlife Health Foundation<sup>2</sup>.
- 

<sup>1</sup>Office of Migratory Bird Management and Office of the Coordinator Environmental Contaminants Evaluation Program, U.S. Fish and Wildlife Service, Department of the Interior, Washington, DC. U.S. Fish and Wildlife Service Pollution Response Plan for Oil and Hazardous Substances, 1 Jun 77 or latest revision, Appendix VI lists addresses for these organizations.

<sup>2</sup>The National Wildlife Health Foundation, 450 Boyd Rd, Pleasant Hill, CA 94523, maintains a national list of active wildlife veterinarians who could be helpful with the animal rescue efforts.

### PART 3 - LEGAL CONSIDERATIONS<sup>1</sup>

As a result of the rapidly expanding scope of the government's involvement in the protection and conservation of wildlife, there are an increasing number of laws regulating the management of wildlife. When an incident occurs on a DARCOM installation, the commander will immediately consult his legal counsel (Post Judge Advocate) and installation medical and environmental personnel to determine whether any federal or state wildlife laws or regulations must be considered when dealing with the problem in order to avoid criminal or civil penalties. To facilitate this analysis, the pertinent features of the applicable federal laws are summarized below.<sup>2</sup>

#### a. MARINE MAMMAL PROTECTION ACT OF 1972.<sup>3</sup>

General: The main thrust of the Act is its moratorium on the "taking" of marine mammals. The Act is administered exclusively by the federal government which preempts the states from any authority over marine mammals in those cases of state programs which have federal approval. Responsibility for implementation of the Act is divided between two departments: (1) Department of Commerce: The Secretary of Commerce, through the Director of the National Marine Fisheries Service, has authority with regard to all members of the order Cetacea (whales and porpoises) and all members, except walruses, of the order Pinnipedia (seals); and (2) Department of the Interior: The Secretary of the Interior, through the Fish and Wildlife Service, has jurisdiction over all other marine mammals (manatees, dugongs, polar bears, sea otters, and walruses).

#### Definitions (as defined by the Act):

Moratorium: "complete cessation" of taking

Taking: "to harass, hunt, capture, or kill". (Harass is included within the scope of the definition for the intent of prohibiting even unintentional acts adversely affecting marine mammals, e.g.; the operation of power boats in waters in which these mammals are found can constitute harassment.)

<sup>1</sup>A more detailed discussion of these laws can be found in "The Evolution of National Wildlife Law" by Michael J. Bean, prepared for the Council on Environmental Quality, 1977.

<sup>2</sup>State laws may have the same implications and should be researched by the Post Judge Advocate.

<sup>3</sup>16 United States Code (U.S.C.) Section (Sec.) 1361-62, 1371-84, and 1401-07 [Supplement (Supp.) IV 1974] as amended by Fisheries Conservation and Management Act of 1976, Public Law (Publ. L.) No. 94-265 Sec. 404, 90 Statute (Stat.) 331.

United States: "includes the several states, the District of Columbia, the Commonwealth of Puerto Rico, the Canal Zone, the possessions of the United States, and the Trust Territory of the Pacific Islands".

Marine mammal: "any mammal which (1) is morphologically adapted to the marine environment (including sea otters and members of the orders Sirenia, Pinnipedia and Cetacea), or (2) primarily inhabits the marine environment (such as the polar bear); and includes any part of any such marine mammal".

Implication: When an incident involves marine mammals, immediately notify the National Marine Fisheries Office, NOAA (C1, Part 2) or the U.S. Fish and Wildlife Service Area Manager (I1) and the Service's Division of Law Enforcement (I1a, Part 2).

b. MIGRATORY BIRD TREATY ACT<sup>1</sup>

General: Except as permitted by regulations (see below), it is unlawful to "take, kill, or possess migratory birds, their nests or eggs". The Department of the Interior has sole responsibility for promulgating the rules and regulations consistent with the purposes of the Act. The states, however, can also make or enforce regulations which are in compliance with those of the Department of the Interior or which give added protection to migratory birds, their nests or eggs.

The Act is implemented through the Fish and Wildlife Service by the federal regulation governing hunting methods, tagging and identification requirements, scientific and other permit requirements and other similar matters.<sup>2</sup>

Definitions

Take: Although the term "take" is not defined by the Act, the Fish and Wildlife Service in these general regulations, defines it to mean "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt" any of the foregoing.<sup>3</sup>

<sup>1</sup>16 U.S.C. Sec. 703-11 (1970 and Supp. IV 1974).

<sup>2</sup>50 Code of Federal Regulations (C.F.R.) Part 20, subparts A through G and L, and Part 21 (1975).

<sup>3</sup>50 C.F.R. Sec. 10.12 (1975). Note also that the Fish and Wildlife Service requires a permit to "scare" or "herd" migratory birds for depredation control purposes [50 C.F.R. Sec 21.41 (1975)].

Migratory birds: Includes (1) migratory game birds, (2) migratory insectivorous birds and (3) other migratory nongame birds.

Implication: When an incident involves migratory birds (that is all species of native birds), immediately notify the U.S. Fish and Wildlife Service Area Manager (I1) and the Service Division of Law Enforcement (I1a) in Part 2 for further instructions.

c. **ENDANGERED SPECIES OF FISH AND WILDLIFE<sup>1,2</sup> (ENDANGERED SPECIES ACT OF 1973)**

General: No person under the jurisdiction of the United States may "take" any endangered (or threatened)<sup>2</sup> species of fish or wildlife anywhere in the United States, its territorial seas or on the high seas. Other prohibitions under the Act include possession of endangered species. The Departments of Commerce and Interior have sole responsibility for designating endangered/threatened species. As the status of species change, or when new species are added, the information is published in the Federal Register (FR). A listing of federally protected wildlife as of June 1976 can be found in the FR, Vol 41, 24062 (June 14, 1976). Fish and Wildlife Service and National Marine Fisheries Service (certain marine mammals, refer to Part 3, paragraph a) have regulatory authority.

Other provisions of the Act which have prompted considerable litigation of late are found in Section 7 of the 16 U.S.C. Sec. 1536 and in summary, state that it is the responsibility of all federal agencies (1) to carry out conservation programs, (2) to insure that their activities do not "jeopardize" the continued existence of endangered or threatened species and (3) to "insure" that their activities do not destroy or modify "critical" habitat of the endangered or threatened species.

Definitions:

Person: "an individual, corporation, partnership, trust, association, or any other private entity, or any officer, employee, agent, department or instrumentality of the Federal Government, of any state or political subdivision thereof, or of any foreign government."

<sup>1</sup>16 U.S.C. Sec. 1531-43 (Supp. IV 1974), as amended by Act of July 12, 1976, Publ. L. No. 94-359.

<sup>2</sup>In general, Fish and Wildlife Service regulations make threatened species subject to the same prohibitions as endangered species. [See 50 C.F.R. Sec. 17.31(a) (1975).]

Take: "includes to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

Endangered Species: "any species which is in danger of extinction throughout its home range or a significant portion of its range." (NOTE: Because the Act defines "species" so as to include distinct geographic populations, it is possible to have a particular species endangered in one area, threatened in another area, and under no protection elsewhere. It is also possible to have a species protected at the state level, but not at the federal level.)

Threatened Species: "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

Fish or Wildlife: "any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, non-migratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof."

Implication: When an incident involves a threatened or endangered species, immediately notify the National Marine Fisheries Office, NOAA (C1) or the U.S. Fish and Wildlife Service Area Manager (I1) and the Service's Division of Law Enforcement (I1a) in Part 2, as appropriate, for further instructions.

#### d. NATIONAL OIL AND HAZARDOUS MATERIALS POLLUTION CONTINGENCY PLAN<sup>1</sup>

General: This plan has been developed in compliance with the Federal Water Pollution Control Act of 1972.<sup>2</sup> It provides for a pattern of coordinated and integrated response by Federal, State and local agencies. One of the objectives of this plan is to minimize damage to wildlife exposed to a discharge of oil and hazardous substances into the coastal waters and inland waters of the United States and their adjoining shorelines. The Plan is prepared by the Council of Environmental Quality. The U.S. Coast Guard National Response Center (T1a, Part 2) has overall responsibility for its implementation. The Departments of Interior and Commerce have responsibility for actions involving wildlife.

#### Definitions:

Oil: "oil of any kind or in any form, including but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil."

<sup>1</sup>40 C.F.R. 1510, FR Feb 10, 1975.

<sup>2</sup>33 U.S.C. 1251, et seq.

Hazardous substance: "any substance designated pursuant to subsection (b)(2) of Section 31 Of the Act."<sup>1</sup>

Coastal waters: "generally are those U.S. waters navigable by deep draft vessels, the contiguous zone, the high seas and other waters subject to tidal influence."

Inland waters: "generally are those waters upstream from coastal waters."

Discharge: "includes but is not limited to any spilling, leaking, pumping, pouring, emitting, emptying or dumping" with certain authorized exceptions.

Implication: When an incident involves a discharge of oil or hazardous substances into coastal or inland waters, immediately notify the National Response Center (Tla) and U.S. Fish and Wildlife Service Area Manager (Il) and request further instructions.

e. PROTECTION OF BALD AND GOLDEN EAGLES<sup>2</sup>

General: With certain exceptions<sup>3</sup> "whoever within the United States or any place subject to the jurisdiction thereof, shall knowingly, or with wanton disregard for the consequences of his act, take or possess any bald eagle or any golden eagle, alive or dead or any part, egg or nest thereof, shall be subject to the penalties prescribed". The Department of the Interior has responsibility for implementing the regulations pertaining to the protection of eagles.

Definitions:

Whoever: "includes also associations, partnerships and corporations."

Take: "includes also pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

Implication: When an incident involves bald or golden eagles, immediately notify the U.S. Fish and Wildlife Service Area Manager (Il) and the Service Division of Law Enforcement (Ila) and request further instructions.

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<sup>1</sup>33 U.S.C. 1251, et seq.

<sup>2</sup>16 U.S.C. Sec. 668 - 668d (1970 and Supp. IV 1974)

<sup>3</sup>Id Sec. 668a.

f. WILD FREE-ROAMING HORSES AND BURROS ACT<sup>1</sup>

General: Anyone, without permission, "who willfully removes or attempts to remove a wild free-roaming horse or burro from the public lands, or converts a wild free-roaming horse or burro to private use, or maliciously causes the death or harrassment of any wild free-roaming horses or burros" is subject to the penalties prescribed. All free-roaming horses and burros are under the jurisdiction of the Department of the Interior, BLM or Department of Agriculture Forest Service, as appropriate for the purpose of management and protection.

Definitions:

Wild free roaming horses and burros: "means all unbranded and unclaimed horses and burros on public lands of the United States."

Public lands: Means any lands administered by Secretary of the Interior through the BLM or by the Secretary of Agriculture through the Forest Service.

Implication: When an incident involves burros or wild horses, immediately notify the National Forest Service Regional Headquarters (A3, Part 2), if on Forest Service land; or the State Director, BLM (I3, Part 3), if on BLM land and request further instructions.

g. BEEKEEPER INDEMNITY PAYMENT PROGRAM<sup>2</sup>

General: Persons releasing toxic materials are responsible for an indemnity payment to the beekeeper should their toxic material destroy or damage a colony of bees.

Definitions:

Person: "individual, partnership, association, corporation, trust, estate, or similar legal entity."

<sup>1</sup>16 U.S.C. Sec. 1331-1340 (Supp. IV 1974), as amended by Federal Land Policy and Management Act of 1976, Publ. L. No. 94-579, Sec. 404.

<sup>2</sup>7 U.S.C. 135b (USDA, ASCS, Title 7, Chap VII, Subchapter C, Part 760) Beekeeper Indemnity Payment Program (1978-1981), extended through September 30, 1981.

Toxic materials: toxic agents, pesticides, insecticides, infectious agents or pollutants whether trace elements or overwhelming substances.

Beekeeper: "a person who maintains colonies of bees."

Colony: "a community of bees together in a hive with the queen."

Colony destroyed: "action of toxic agents or pesticide so severe that colony will not survive."

Colony moderately damaged: "a colony so damaged that only field bees are destroyed."

Colony severely damaged: "a colony in which field bees are destroyed and brood damaged, but colony will survive."

Implication: Whenever an incident involves domestic bees, contact the Agricultural Stabilization and Conservation Service through the Military Liaison Officer (A1, Part 2) for further instructions.



## PART 4 - GUIDELINES ON SELECTED ACTIONS

### a. GENERAL

Toxic compounds causing an incident can be washed downstream or evaporated as the day progresses, carcasses can be carried off by scavengers, and disease can spread rapidly. Therefore, time is of the essence. The response team must consist of personnel already familiar with investigation techniques. No time will be available to train paraecologists in anatomy, sterile techniques and avoiding cross-contamination. Fortunately, most installations have veterinary and medical technicians already trained in these areas who can and should serve as the paraecologists on the installation response team. These individuals are familiar with the proper techniques and only require guidance on how to apply techniques to an incident. Most installations have photographers who can document the incident and the installations actions. Frequently the independent investigators will be trained personnel from the U.S. Army Health Service, The Department of the Interior, The Department of Agriculture, EPA or other federal or state agencies.

To ensure expeditious response to an incident, the commander should obtain the equipment and documents identified in Part 4 which would be necessary to investigate the kinds of incidents that would be likely to occur on the installation. Paraecologists should also be designated so that they can familiarize themselves with the suggested procedures.

### b. INTRODUCTION

Part 4 is a guide to actions which should be taken by the paraecological members of the installation response team. The guide has been divided into subsections that discuss the types of actions required during the investigation of an incident. Each subsection includes an overview of a possible incident and suggested methods of data collection or, in the case of animal rescue, methods of rescue. The suggested data collection methods addressed are:

- (1) Record Keeping. The method used to ensure the incident is well documented.
- (2) Preliminary Information. Information obtained before any actions are undertaken.
- (3) Physical Observation. The deliberate viewing and measuring of the occurrence to include any phenomena.
- (4) Chemical and/or Biological Data. The methods of obtaining these data and samples may bear heavily on resolving the cause.

- (5) Processing or Refining the Sample. The steps necessary to get the sample ready for shipment.
- (6) Shipping Technique. How to pack and ship the samples so they arrive safely.
- (7) Observation Checklist. A summary of preliminary information.
- (8) Sample Collection Checklist. A summary of physical, chemical and/or biological data.
- (9) Equipment Checklist. A list to ensure everything will be available when and where needed.

Before the actual investigation is undertaken, verify that the techniques used are compatible with the procedures of the laboratory analyzing the samples.

#### c. INVESTIGATION OF CAUSE

##### (1) Incident Involving Marine and Freshwater Invertebrates and Fishes

(a) Overview: Most of what follows pertains to fishes and invertebrates, although some will also apply to waterfowl. A more direct approach to incidents involving waterfowl is contained in paragraph 4.c(2). Refer to the Introduction paragraph of Investigating Fish Mortalities by the U.S. Department of the Interior.<sup>1</sup>

##### (b) Data Collection:

###### Record Keeping:

Log of the incident: Refer to Appendix B.

Marking samples: Refer to Appendix B.

Label: Refer to Appendix B.

Preliminary Information: Obtain the information called for in Appendices A and C. NOTE: When identifying the site of the incident, remember that in streams and often in open water, dead fish are washed

<sup>1</sup>Division of Technical Support, Federal Water Pollution Control Administration, U.S. Department of Interior, Washington, DC, Investigating Fish Mortalities, CWT-5, 1970. Available from the EPA Office of Water Planning and Standards (E1a, Part 2).

or blown away rapidly from the kill location. When estimating the losses, indicate whether all carcasses are floating or whether some are known to have sunk to the bottom. In large kills, count the dead fish in a representative area and extrapolate this count to the total area. Also note whether a particular size class or age seems to be involved.

Physical Observation: Refer to Appendix D and "Physical Observations" paragraph of Investigating Fish Mortalities pages 5 through 7.<sup>1</sup>

Chemical Data: Refer to Appendix E and "Chemical Data" paragraph of Investigating Fish Mortalities pages 7 and 8.<sup>1</sup>

Biological Data:

Identification of species: Refer to Appendix F.

Permit requirements: Refer to Appendix G.

Biological samples: Refer to Appendix H and the following paragraphs of Investigating Fish Mortalities: first paragraph under "Biological Data" (page 8), first paragraph on page 11, the paragraph on caged fish (page 12) and the last paragraph on page 12.<sup>1</sup> A long handled garden rake will be useful in collecting specimens from shoreline debris in parts of the country where poisonous snakes or wasps pose a problem. A dip net will be useful in collecting floating carcasses. A seine as described in Chapter 6, Volume 5 will be useful for collecting live samples.

Processing or Refining Sample: Refer to Appendix I and paragraph on blood samples (page 11) of Investigating Fish Mortalities.<sup>1</sup>

Preserving technique: Refer to Appendix J and pages 9 through 13 of Investigating Fish Mortalities.<sup>1</sup>

Shipping Technique: Refer to Appendix K and last paragraph, page 10 of Investigating Fish Mortalities.<sup>1</sup> Refer to Appendix B for carcass disposal.

Observation Checklist: Refer to pages 16 through 19 of Investigating Fish Mortalities.<sup>1</sup> Also complete EPA Form 7500-8 (rev. 7-75) shown in Figure 4-1. Obtain the form from and send the completed form to the EPA Office of Water Planning and Standards (E1a, Part 2).

<sup>1</sup>Division of Technical Support, Federal Water Pollution Control Administration, U.S. Department of the Interior, Washington, DC, Investigating Fish Mortalities. CWT-5, 1970. Available from the EPA Office of Water Planning and Standards (E1a, Part 2).

U.S. ENVIRONMENTAL PROTECTION AGENCY OFFICE OF WATER PLANNING AND STANDARDS WASHINGTON, D.C. 20460		Form Approved OMB No. 158-R0036 <b>FOR OWP USE ONLY</b>
<b>REPORT OF POLLUTION-CAUSED FISH KILL</b>		
1A. LOCATION (Stream, Lake, Ocean, etc; Latitude-Longitude)		2. DATE OF KILL
B. NEAREST TOWN AND COUNTY	C. STATE	3. TYPE OF WATER <input type="checkbox"/> FRESH <input type="checkbox"/> SALT <input type="checkbox"/> ESTUARY
4. POLLUTION SOURCE - TYPE OF OPERATION		
A. AGRICULTURAL OPERATIONS <input type="checkbox"/> POISONS (Pesticides, etc) <input type="checkbox"/> FERTILIZERS <input type="checkbox"/> MANURE DRAINAGE, ENSILAGE LIQUORS, OR FEED LOT OPERATIONS <input type="checkbox"/> HANDLING OF EQUIPMENT AND CONTAINERS	B. INDUSTRIAL OPERATIONS <input type="checkbox"/> MINING <input type="checkbox"/> CHEMICALS <input type="checkbox"/> FOOD AND KINDRED PRODUCTS <input type="checkbox"/> TEXTILES <input type="checkbox"/> OTHER:	C. MUNICIPAL OPERATIONS <input type="checkbox"/> METALS <input type="checkbox"/> PETROLEUM <input type="checkbox"/> PAPER AND ALLIED PRODUCTS <input type="checkbox"/> RUBBER AND PLASTICS <input type="checkbox"/> SEWERAGE SYSTEM <input type="checkbox"/> REFUSE DISPOSAL <input type="checkbox"/> WATER SYSTEM <input type="checkbox"/> SWIMMING POOL <input type="checkbox"/> POWER (Public Service) <input type="checkbox"/> PEST CONTROL
D. TRANSPORTATION OPERATIONS <input type="checkbox"/> RAIL <input type="checkbox"/> TRUCK <input type="checkbox"/> BARGE OR BOAT <input type="checkbox"/> PIPE-LINE <input type="checkbox"/> AIR		E. CONSTRUCTION OR OTHER <input type="checkbox"/> CONSTRUCTION <input type="checkbox"/> OTHER:
		F. UNKNOWN <input type="checkbox"/>

G. SPECIFIC POLLUTANT OR FACTOR CHANGING WATER CHARACTERISTICS (Name of chemical, thermal discharge, etc.)					
5. TYPE OF FISH KILL		6. EST. NO. KILLED		7. SEVERITY	
GAME	%			<input type="checkbox"/> TOTAL <input type="checkbox"/> HEAVY <input type="checkbox"/> MOD. <input type="checkbox"/> LIGHT	
NON-GAME	%	8. EXTENT OF AREA AFFECTED		9. DURATION OF CRITICAL EFFECT	
TOTAL	100 %	A. MILES OF STREAM	B. ACRES OF LAKE	A. DAYS	B. HOURS
COMMERCIAL	%				
10. ADDITIONAL REMARKS (Include effects on other than marine life, e.g., shellfish, waterfowl, etc)					
11. REPORTING OFFICIAL		12. AGENCY MAILING ADDRESS		13. DATE OF REPORT	

EPA Form 7500-8 (Rev. 7-75) PREVIOUS EDITION MAY BE USED UNTIL SUPPLY IS EXHAUSTED.  
 INSTRUCTIONS: Upon completion fold card to show proper address and staple or tape long edge together.

Figure 4-1. Environmental Protection Agency Form 7500-8.

Sample Collection Checklist: Refer to "Sample Collection Summary", page 13 of Investigating Fish Mortalities<sup>1</sup>

Equipment Checklist: In addition to the following refer to Appendix L:

- Thermometers
- Recording thermometer
- Dissolved oxygen test kit
- Calibrated electronic dissolved oxygen probe and portable recorder
- pH meter
- General chemistry kit, to include specific conductance, pH, and methyl orange alkalinity
- Dip net
- Petersen dredge
- Square-foot stream bottom sampler
- Standard sieves
- Baskets
- Boats
- Waders
- Long-handled garden rake
- Ice chest
- Chemical sample bottles
- Plastic bags for shipping fish
- Glass bottles with teflon-lined covers
- 1-liter sample bottles for water samples
- Quart or gallon glass jars for sludge samples
- 5 to 10 cubic centimeter (cc) glass vials with stopper
- 20 cc glass vials
- Preservative (formalin)
- Chromic acid
- Paper towels
- Distilled water
- Organic solvent (e.g. acetone, hexane, ether, chloroform)
- Detergents
- Absorbent cotton
- Hypodermic needle
- Fish mortality information sheet (EPA Form 7500-8)
- Aluminum foil
- Wire baskets or cages

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<sup>1</sup>Division of Technical Support, Federal Water Pollution Control Administration, U.S. Department of the Interior, Washington, D.C. Investigating Fish Mortalities. CWT-5, 21 pp 1970. Available from the EPA Office of Water Planning and Standards (Ela, Part 2).

(2) Incident Involving Marine, Freshwater Waterfowl and Land Birds

(a) Overview: The term "waterfowl" includes those birds that spend part of their life on or in the water as well as shore birds - those that live along the edge of the water. The usual causes of incidents involving birds are adverse weather, disease, hazardous substances or tall structures projecting into flyways.

(b) Data Collection:

Record Keeping:

Log of the incident: Refer to Appendix B.

Marking samples: Refer to Appendix B.

Label: Refer to Appendix B.

Preliminary Information: Refer to Appendix C. Obtain the information called for in Appendix A. When identifying the site of the incident, remember that in streams and often in open water, dead waterfowl are washed or blown away rapidly from the site of the incident.

Physical Observations: Refer to Appendix D. Low temperatures can be a factor in the incident, especially when solvents are present in water. Therefore, obtain the air temperature and the water temperature (in degrees Celsius).

Chemical Data: Refer to Appendix E. Note the general appearance of the water (for example: color and clarity). The presence of oil or excessive algae is also noteworthy. The appearance of the dead birds (whether soaked with oil etc.) and the behavior of birds that remain alive should be noted. Look for U.S. Fish and Wildlife Service bands on the legs of dead birds. Send band and information on how, when and where found and your name and address to the Bird Banding Laboratory (Ilc, Part 2) or call the Bird Banding Laboratory (extension 204) and give the above information over the phone. Be sure the band number is correct. The laboratory will send a copy of the data card on that bird for your information.

Biological Data:

Identification of species: Refer to Appendix F and use Robbins, C.S., B. Bruun and H.S. Zim. A Field Guide to the Identification of Birds of North America, Golden Press, NY, 1966.

Permit requirements: Refer to Appendix G.

Biological samples: Refer to Appendix H. Look for carcasses, on beaches, particularly along the high tide line of ocean beaches. Examine specimens for evidence of oiling or other cause of death. Note if oil is present on other debris on the beach. Look for carcasses next to tall structures on land. All carcasses that have been dead too long to provide reliable samples (Appendix H) need only be identified, recorded in the log of the incident, and disposed of (Appendix B).

Cholinesterase: The possibility of anticholinesterase intoxication can be investigated by measuring the acetylcholinesterase (AChE) level in affected animals and comparing them to levels in healthy animals that have not been in the area of the incident or with appropriate levels reported in the literature. Brain and intercostal muscle provide the most reliable measure of AChE levels in dead animals. Erythrocyte (red cell) AChE is useful because it can be obtained repeatedly from many species of live animals without serious trauma. Thus, the AChE level in a given animal can be followed with time.

Refinement of sample: It may be necessary to obtain the head and samples of intercostal (rib) muscles from dead birds. Further dissection will be accomplished at the laboratory receiving the sample. It may also be necessary to obtain a sample of blood from each live bird collected.

Head: Sever the skin and neck muscles below the skull with a sharp scalpel. Using bone scissors, cut through the backbone in the neck.

Rib muscles: Pluck the feathers from an area approximately 7 centimeters (cm) square<sup>1</sup> on the left side of the animal immediately behind the wings. Approximately 2 cm to the left of the backbone, cut across the ribs with bone scissors for about 7 cm, paralleling the backbone. At the front and back of this cut, with a scalpel, sever the muscle along a rib (toward the belly) for about 7 cm. With bone scissors, cut between the ends of these last two cuts producing an approximately 7 cm square section of skin, ribs and rib muscle.

<sup>1</sup>Required dimensions are approximate. They should be more if the bird is large, less if the bird is small. In the latter case, as large a sample as possible should be obtained.

#### Blood (live birds):

Amounts of blood required: Obtain blood from each bird in sufficient quantities for the laboratory tests designated by the team leader. Use a new syringe, needle and heparinized Vacutainer<sup>R</sup> or equivalent, for each sample. With small birds, use a disposable plastic syringe and a 22 guage needle. With large birds (ducks and larger) use a 1-1/2 inch Vacutainer<sup>R</sup> needle, a Vacutainer<sup>R</sup> holder and heparinized Vacutainer<sup>R</sup> tube. The needle should be disposed of each time, the holder can be used repeatedly. With the needle and syringe assembled, insert the needle through the rubber stopper into a bottle of sodium heparin (1,000 units per milliliter (ml) - heparin should be kept refrigerated when not in use). Flush the syringe and needle with heparin to prevent clogging. Anesthetize the bird with CO<sub>2</sub> (Appendix H).

Heart puncture is the simplest method to obtain the blood sample.<sup>1</sup> Holding the bird firmly in one hand, insert the needle at a point just posterior to the end of the rib cage near the bird's stomach. When a syringe is used, carefully push the needle in and withdraw the plunger from time to time to determine if the heart cavity has been reached (blood will be withdrawn if the needle is in the heart cavity). For small birds, bleed to exsanguination (usually necessary in order to obtain enough blood). After the sample is taken, withdraw the needle and insert it into an open, 3 ml heparinized Vacutainer<sup>R</sup>. Push the plunger down to evacuate the contents of the syringe into the Vacutainer<sup>R</sup> tube, recap the tube with its top, dispose of the needle and syringe. When a Vacutainer<sup>R</sup> holder is used, blood will spurt into the Vacutainer<sup>R</sup> tube if the needle is in the heart cavity. Label the heparinized tube with the ID number on the standard label (Appendix B). Labeling is accomplished with a short piece of Time<sup>R</sup> tape and a black permanent ink, felt-tip pen. Make certain the number is read right side up when the heparinized tube is oriented with the top up.

Preserving technique: Refer to Appendix J.

Head and rib muscle: Immediately after removing, place the head and the section of rib muscle in the same freezer bag. Enclose a standard label (Appendix B) seal the bag and place it in the portable ice chest. Back in your work area, place the bag in a freezer at -21° Celsius (C). Record appropriate data (Appendix B) in the log of the incident. Place each carcass in a plastic bag and label the bag for disposal (Appendix B) or take additional samples described below (as instructed).

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<sup>1</sup>An alternate method which requires more skill, is a wing vein puncture.



Blood: As soon as possible after collection, the heparinized blood samples are centrifuged in a refrigerated (4° C) centrifuge at 1000 to 1500 gravities<sup>1</sup> for 15 minutes. The plasma and "buffy coat" layer (composed of white cells and cell fragments) are removed from each sample by aspiration. Two volumes of physiological saline solution (Appendix J) are added to each sample to maintain osmotic pressure. Each sample is then mixed gently, by inverting the tubes, and centrifuged as above. The supernatant fluid is removed by aspiration, and the remaining cells are stored at -21° C until assayed.

Botulism toxin: Botulism toxin is not destroyed by freezing and may be present anywhere in a bird's body. Consequently, the simple procedure described below can be followed in the field. The remainder of the investigation will be carried out at the receiving laboratory.

Refinement of sample and preserving technique: Place each bird in a separate freezer bag along with a standard label (Appendix B). Place each bag in the portable ice chest. Record appropriate data (Appendix B) in the log of the incident. Store at -21° C until standard sample (Appendix H) is obtained.

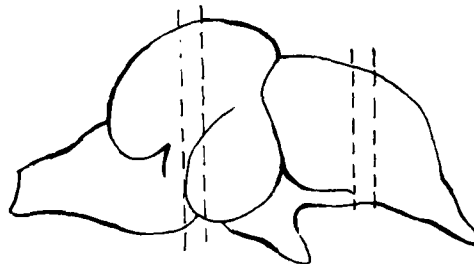
Necropsy<sup>2</sup>: Since disease can manifest itself in any organ, a large sample of organs may be necessary. This procedure will also suffice for a parasite survey.

Refinement and preserving technique necessary for samples preserved in formaldehyde: Remove the feathers from the top of the head. Starting between the eyes, and proceeding toward the rear, cut the skin with a scalpel to the base of the skull. Peel the skin back and with a pair of pliers carefully chip away the roof of the skull. Sever all the nerves entering the brain, remove the brain from the skull. Cut in two along the groove that runs down the middle of the brain from front to rear.

<sup>1</sup>The equation for calculating gravities (relative centrifugal force) is:  $.000001118 \times r \times N^2$ ; where  $r$  = rotating radius [centimeters (distance from center of centrifuge head to half way down one of the centrifuge tubes)]; and  $N$  = rotating speed of centrifuge (revolutions per minute).

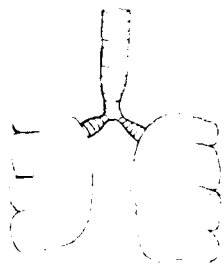
<sup>2</sup>Further instructions on appropriate tissues to sample for various diseases are found in: Veterinary Services Laboratories, Animal and Plant Health Inspection Service, U.S. Department of Agriculture. Diagnostic Reference Manual, 1974.

Cut two slices in the left half no more than 1/4 cm thick as shown:

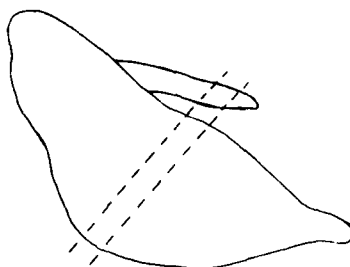


Place slices in a jar containing 4 percent formaldehyde (Appendix J). Pluck the feathers from an area on the ventral side (underside) approximately an inch wide and extending from the neck to the cloaca (vent). With a scalpel or sharp scissors, carefully cut the skin and thin muscles lying immediately beneath, in a line extending from the neck to the cloaca. Peel the tissue away from both sides of the cut. At this point, the esophagus, crop and trachea should be exposed in the neck region and the viscera (intestines etc) in the stomach region. Lying between the two exposed areas is a large mass of muscles attached to the keel (the pieces of bone running down the middle of the mass). Using a scalpel cut the muscle on the right side of the keel extending from the front to the rear. Make the cut deep enough to reach the base of the keel. Peel the muscle away from the keel. With bone scissors, cut through the bone slightly to the right of the keel keeping the scissors in contact with the bone so as to avoid injuring internal parts. Spread apart the cut edges. Remove a section from the center of each of the following organs and place in the formaldehyde jar with the sections of the brain. You may be required to remove a representative sample of the contents of the gastrointestinal tract (crop, proventriculus, gizzard and intestines) for analysis of the material ingested. Place the samples in a plastic bag.

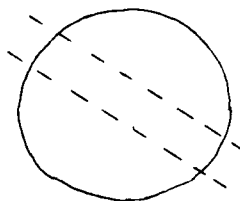
One, 2 cm section from the windpipe and one, 1/4 cm section from the left lung as shown:



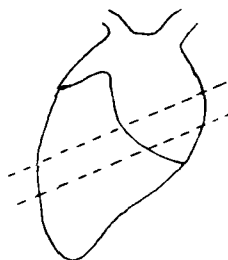
One, 1/4 cm section from the liver so as to include the gall bladder as shown:



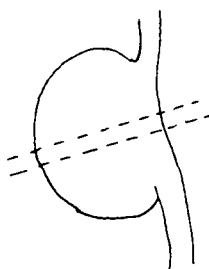
One, 1/4 cm section from the spleen as shown:



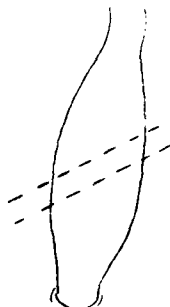
One, 1/4 cm section through the heart as shown:



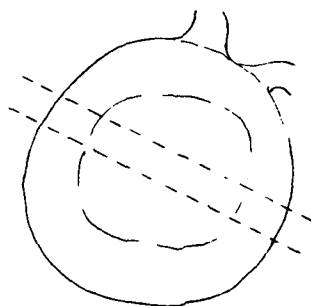
One, 1/4 cm section through the crop as shown:



One, 1/4 cm section through the proventriculus as shown:



One, 1/4 cm section through the gizzard as shown:



One, 2 cm section from the small intestine and one, 2 cm section from the large intestine.

Finally, remove the feathers from the drumstick portion of the left leg and slice off a 1/4 cm thick section of the leg muscle, extending the cut down to the drumstick bone and around the leg far enough to include a slice of at least 1/2 of the muscles that surround the bone at that point.

Tape<sup>1</sup> a standard label (Appendix B) on the glass jar and enter the appropriate data in the log (Appendix B).

Keep the above samples in the formaldehyde for at least 24 hours to allow adequate fixing. After 24 hours remove and place the sections in gauze (soaked in formaldehyde). Seal the samples in Whirl-Pak<sup>R</sup> bags, or equivalent.

When a standard sample (Appendix H) has been obtained, send it to the receiving Laboratory using the shipping method for non-frozen samples (Appendix K).

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<sup>1</sup>Adhesive tape applied so as not to cover data on the label.

Refinement and preserving technique for frozen necropsy samples: Carefully tie off the cut ends of the digestive system organs and remove the remainder of the viscera (lungs, heart, intestines, etc.). Place the viscera, with the remnants of the organs sectioned for the formaldehyde fixing procedures, into a single freezer bag. For these samples and the samples of ingested material in the gastrointestinal tract, include the standard label, record the appropriate data in the log and place the bag in the portable ice chest. Separate bags with aluminum foil. Upon returning to your work area, place the bags in a freezer set at  $-21^{\circ}\text{C}$ .

Pathogens: Bacterial, viral, rickettsial and fungal diseases can be centered in many organs. Any organ removed prior to post-mortem decomposition with evidence of necrosis, enlargement, abscess, discoloration, or hemorrhage should be cultured for bacteria or fungi. The organs or tissues from which the most common agents of disease in birds are likely to be isolated are the following: Lungs (air sacs), liver, intestine, heart (inside surface of the pericardium - the thin tissue surrounding the heart), blood, brain, and bone marrow (as in the drumstick).

Refinement and preserving technique: Allow as little time as possible between collection and initiation of these procedures. During the interim, refrigerate (do not freeze) the samples.

Contamination of the sample with the fast-reproducing microorganisms from surfaces, personnel or instruments may obscure slow-growing pathogens in the sample. As a consequence, extreme care must be taken to use sterile procedures. Sterile instruments, swabs, scalpels, scissors, syringes, tubes, covered dishes etc. will be required. Instruments used to prepare tissues should be sterilized by flaming. Surfaces exposed to the air, such as the skin or organ surfaces (See "Necropsy", page 4-9 for dissection directions) should be seared with a hot blade just prior to securing the swab sample. Once a surface is sterilized, cut into the organ with a sterile scalpel and secure a sample from the cut surface. Fluids<sup>1</sup> such as blood (See Cholinesterase, page 4-7) should be placed in a sterile container and labeled with the proper identification number.

It is recommended that two sampling procedures be used on each tissue sampled: (1) one swab sample used to inoculate the media immediately and (2) a second swab sample to be sent to the receiving laboratory in its original state. (Culturette<sup>R</sup> swabs or equivalent are best to use for the latter since they have a capsule of transport medium which can preserve organisms for at least 24 to 48 hours.)

<sup>1</sup>Refer to Chapter 2, U.S. Department of the Army, Laboratory Procedures in Chemical Bacteriology, TM 8-227-5, Apr 1963.

Because microorganisms have different atmospheric and nutritional requirements, it may be necessary to make several cultures from each tissue sampled. It is recommended that each medium<sup>1</sup> be incubated in the following atmospheres: aerobic, anaerobic and carbon dioxide enriched<sup>2</sup>.

Shipping Technique:<sup>3</sup> After labeling all samples with the standard label (Appendix B) dispose of the carcasses (Appendix B) and after 24 hours send the cultures, Culturette<sup>R</sup> swabs, blood sera and anaerobic jars to the receiving laboratory via the appropriate shipping method (Appendix K).

Observation Checklist: If sending information to the Atlantic and Gulf Coast Beached Bird Survey Project (P1, Part 2) or Point Reyes Bird Observatory (P2, Part 2), use their data forms shown in Figures 4-2 and 4-3 respectively.

<sup>1</sup>The media to be used will be determined by the team leader or receiving laboratory.

<sup>2</sup>Refer to Chapter 4, U.S. Department of the Army, Laboratory Procedures in Chemical Bacteriology, TM 8-227-5, Apr 1963.

<sup>3</sup>Refer to Chapter 2, pages 2-13 through 2-17, U.S. Department of the Army, Laboratory Procedures in Chemical Bacteriology, TM 8-227-5, Apr 1963.

BEACH: \_\_\_\_\_

OBSERVER(S): \_\_\_\_\_

<u>Date</u>	<u>Species</u>	<u>Age/Sex</u> 1-Juvenile 2-Sub-adult 3-Adult	<u>Oiled</u> 0-None 1-Light 2-Medium 3-Heavy	<u>Carcass</u> 1-Fresh 2-Medium 3-Decomp.	<u>Remarks</u> Band No., if banded, cause of death, etc.

Figure 4-2. Atlantic and Gulf Coast Beached Bird Survey Project Form.





Sample Collection Checklist:

Chemical data:

Water - 10, 1-liter samples  
Mud, silt and sludge - sufficient samples to cover  
area of the incident  
Aquatic plants - sufficient samples in 20 cubic  
centimeter vials  
Terrestrial plants - pressed samples of plants of  
interest

Biological data: Where appropriate, the following  
samples from 5 to 10 freshly dead, 5 to 10 dying and 5 to 10 animals  
alive and apparently normal at the time of capture:

Cholinesterase:

whole head  
7-cm square of ribs and intercostal muscles  
sufficient sample of blood

Botulism toxin:

whole bird

Necropsy, formaldehyde:

two, 1/4 cm slices of brain tissue  
one, 2 cm slice of trachea  
one, 1/4 cm slice of heart  
one, 1/4 cm slice of lung  
one, 1/4 cm slice of kidney and gall bladder  
one, 1/4 cm slice of spleen  
one, 1/4 cm slice of crop  
one, 1/4 cm slice of proventriculus  
one, 1/4 cm slice of gizzard

one, 2 cm slice of small intestine

one, 2 cm slice of large intestine

one, 1/4 cm slice of leg muscle

Necropsy, freezing:

the remainder of the tissues sampled, but not included in the "Necropsy, formaldehyde" samples above.

Pathogens from possibly diseased tissue:

one tube of medium inoculated in aerobic atmosphere

one tube of medium inoculated in carbon dioxide enriched atmosphere.

Culturette<sup>R</sup> swabs, or equivalent

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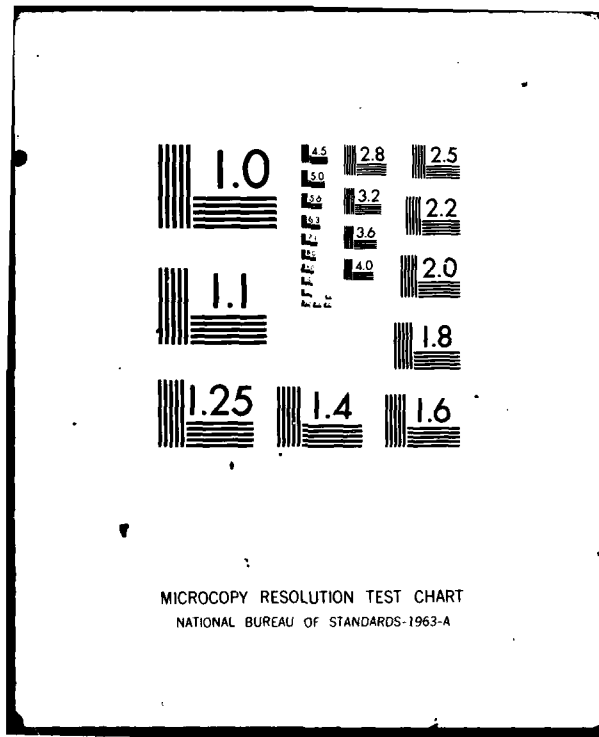
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Equipment Checklist: In addition to the following refer to Appendix L.

Scotch tape, or equivalent  
Razor  
Bone scissors  
Propane torch  
Freezer bag  
Portable ice chest (field) and -21° C freezer (work area)  
Prenumbered cardboard tags  
Prenumbered strips of tape  
Black permanent ink, felt-tip pen  
Circular key ring  
Sheet of stainless steel  
12-gauge shotgun  
No. 4 shot with a high base shell  
Shotgun slugs  
Vacutainer<sup>R</sup> needles, or equivalent  
10 ml Vacutainer<sup>R</sup> holder, or equivalent  
Heparinized Vacutainer<sup>R</sup>, or equivalent  
70 Percent alcohol  
Sterile cotton pledgets  
Saline solution  
Centrifuge (work area)  
Japanese mist nets  
Sterile, disposable glass syringes  
25 Gauge needles  
Dry ice  
CO<sub>2</sub> anesthetizing jar  
3 ml Heparinized Vacutainer, or equivalent  
Time<sup>R</sup> tape, or equivalent  
Saline solution  
Pliers  
4 Percent formaldehyde  
Sharp scissors  
Small blow torch (field) or bunsen burner (work area)  
Culturette<sup>R</sup> swabs, or equivalent  
Sterile containers  
Culture tubes  
Aerobic medium  
Anaerobic medium  
Anaerobic jar  
Carbon dioxide enriched medium  
Incubator  
Anaerobic catalyst and generator  
Candle  
Jar with tight fitting lid  
Matches  
Petri dishes

(3) Incident Involving Marine Mammals

(a) Overview: Marine mammals are occasionally involved in oil spills and spills of other hazardous substances. They also become stranded on the beaches through a variety of causes.

(b) Data collection:

Record Keeping: Refer to Appendix B.

Preliminary Information: Refer to Appendix C.

Physical Observations: Refer to Appendix D.

Remainder of Study: Should be handled only by federally authorized individuals as discussed in Part 3.

#### (4) Incidents Involving Land Invertebrates

(a) Overview: With the exception of bees (Chapter 7, Volume 4) and Part 3, paragraph g of this volume, it is unlikely that invertebrates would be affected noticeably by an incident. However, invertebrates such as tapeworms and roundworms can be involved in an incident by weakening the host so that it is more susceptible to disease, weather extremes, etc. Collecting tissues of the host for internal parasites is covered in the sections on Necropsy, Part 4.c(2) and (6). Many invertebrates are troublesome to the host but do not generally cause death<sup>1</sup>. Mosquitoes, fleas and ticks are vectors for encephalitis (in horses), plague (in rodents) and Rocky Mountain spotted fever viruses, respectively. Mosquitoes and fleas are the only ones likely to cause an unexpected decline in livestock or wildlife which would come to the attention of the commander. Ticks can carry Rocky Mountain spotted fever, a disease with public health implications in certain areas of the United States. These three invertebrates will be discussed below.

#### (b) Data collection:

##### Record Keeping:

Log of the incident: Refer to Appendix B.

Marking samples: Refer to Appendix B.

Mosquitoes: Refer to pages 3, 4, 8, 9 and 10<sup>2</sup>

<sup>1</sup>"Maggots, grubs, caterpillars and tongue worms infest the flesh or the intestinal tracts. Spiders, ticks, mites, lice, bugs, fleas and others bite; scorpions, wasps and caterpillars sting. Blister beetles and millipedes secrete a vesicating exudate. Mayflies, caddis flies and stored food insects are allergenic." Quoted from: U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Techniques of Public Health Entomology, H.G. Scott and M.R. Borom, Undated.

<sup>2</sup>U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Collection and Processing of Medically Important Arthropods for Arbovirus Isolation, W.D. Sudia and R.W. Chamberlain, July 1974.

Fleas: Refer to page 3<sup>1</sup>

Ticks: Refer to page 3<sup>2</sup>

Label: Refer to Appendix B.

Preliminary Information: Refer to Appendix C.

Physical Observations: Refer to Appendix D. Obtain information on carcasses of larger organisms and continue the investigation on them as described in Part 4.c.(2), page 4-6 and Part 4.c.(6) Page 4-27.

Chemical Data: Refer to Appendix E.

Biological Data:

Identification of species: Generally, the identification of arthropods should be left to the experts.

Collecting permits: Collecting permits will not be required, unless the species being collected is endangered, in which case see Appendix G.

Biological samples: There are many ways to collect the three arthropods. A few of the better ones follow:

Mosquitoes: Refer to pages 1 to 3 and 6 to 12 of Collection and Processing of Medically Important Arthropods for Arbovirus Isolation<sup>3</sup>.

Fleas: Rodent hosts are trapped using the techniques in Chapter 8, Volume 4. The rodents are handled and their fleas are collected according to the procedures on pages 36-37 of Plague Epidemiology<sup>1</sup> and pages 5 through 7 of Techniques of Public Health Entomology<sup>2</sup>.

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<sup>1</sup>U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Plague Epidemiology, H.E. Stark, B.W. Hudson and B. Pittman, 1966.

<sup>2</sup>U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Techniques of Public Health Entomology, H.G. Scott and M.R. Borom, Undated.

<sup>3</sup>U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Collection and Processing of Medically Important Arthropods for Arbovirus Isolation, W.D. Sudia and R.W. Chamberlain, July 1974.



Ticks: Rodent hosts are trapped using the techniques in Chapter 8, Volume 4. The rodents are handled and their ticks are collected according to the procedures on page 30 of Ticks of Public Health Importance and Their Control<sup>1</sup> and pages 5 through 7 of Techniques of Public Health Entomology<sup>2</sup>

Processing of Samples: Does not apply to arthropods, as pooling of samples, etc. require specialists.

Preserving technique:

Mosquitoes: Mosquitoes should be placed in a container and the container placed in a chest with dry ice. As soon as the chest is returned to the lab, the containers of mosquitoes should be placed in a freezer set at -70° Celsius (C) until they are shipped to the receiving laboratory.

Fleas: Preserve fleas in vials containing 2 percent saline solution (2 percent by weight sodium chloride and 98 percent by weight water).

Ticks: After collecting the ticks, place them alive in vials for shipment.

Shipping Technique:

Mosquitoes: Use the shipping method for frozen material, Appendix K.

Fleas: Ship in the vials containing 2 percent saline, use the shipping method for non-frozen material, Appendix K.

Ticks: Ship in the vials containing the live specimens, use the shipping method for non-frozen material, Appendix K.

Observation Checklist: Refer to Part 4.c.(6). See Figures 17, 18 and 19 (pp. 40-42) of Plague Epidemiology<sup>3</sup>.

<sup>1</sup>U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Ticks of Public Health Importance and Their Control, H.D. Pratt and K.S. Littig, 1974.

<sup>2</sup>U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Techniques of Public Health Entomology, H.G. Scott and M.R. Borom, Undated.

<sup>3</sup>U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Plague Epidemiology, H.E. Stark, B.W. Hudson and B. Pittman, 1966.

Sample Collection Checklist:

Pools of mosquitoes

Fleas from animals

Ticks from animals and cloth drags

Equipment Checklist: In addition to the following refer to,  
Appendix L.

CDC light traps, or equivalent

4- or 6-Volt batteries

Cases for transporting light traps and batteries

Lightweight rope

Dry ice

String

Aluminum foil

Frozen quart refreezant cans

Chill chest

Aspirator

Forceps

Vials

Rubber stoppers for vials

1/2-Inch waterproof adhesive tape

Cylindrical ice cream cartons

Flashlight

Battery-powered aspirator

1 Pint cylindrical ice cream cartons with fine mesh on both  
ends

Bait traps

Small wire mesh platforms

White flannel cloth, three feet square

Drag cloth

Cloth bags

White enamel pans

Comb

Detergent

Filter paper

Funnels

2 Percent saline solution

Equipment listed in Part 4.c.(6) for trapping of rodents

(5) Incidents Involving Land Reptiles and Amphibians

(a) Overview: Of all the groups covered, terrestrial reptiles are probably the least apt to be involved in an incident. Nonetheless, they could become involved, through pesticide application or the release of other hazardous substances. Because amphibians and some reptiles (alligators, crocodiles and some snakes and turtles) spend part of their lives in water, they can be adversely affected by water pollution. Proper techniques for handling reptiles and amphibians can be found in A Field Guide to Reptiles and Amphibians<sup>1</sup>.

(b) Data Collection: Refer to Part 4.c.(1) if aquatic.

Record Keeping:

Log of the incident: Refer to Appendix B.

Marking samples: Refer to Appendix B.

Label: Refer to Appendix B.

Preliminary Information: Refer to Appendix C.

Physical Observation: Refer to Appendix D.

Chemical Data: Refer to Appendix E.

Biological Data:

Identification of species: A Field Guide to Reptiles and Amphibians<sup>1</sup> and A Field Guide to Western Reptiles and Amphibians<sup>2</sup>. Also refer to Appendix F.

Permit requirements: Refer to Appendix G. Some states require permits for collecting reptiles and amphibians.

Biological samples: Refer to Appendix H.

Amphibians and Reptiles: Refer to Volume 4, Chapter 4, and see pages 11 to 17 of A Field Guide to Western Reptiles and Amphibians<sup>2</sup>.

<sup>1</sup>Conant, R., A Field Guide to Reptiles and Amphibians. Peterson Field Guide Series, Houghton Mifflin Co., Boston, 1958.

<sup>2</sup>Stebbins, R.C., A Field Guide to Western Reptiles and Amphibians. Peterson Field Guide Series, Houghton Mifflin Co., Boston, 1966.

Processing of Samples: All samples will consist of whole specimens.

Preserving Technique: Preserve reptiles and amphibians in a solution of buffered formalin (Appendix J). Inject formalin into the body cavity of specimens larger than small frogs.

Shipping Technique: Ship via the technique for non-frozen specimens, Appendix K. If live specimens are to be shipped, follow the procedure on page 17 of A Field Guide to Reptiles and Amphibians<sup>1</sup>. Refer to Appendix B for carcass disposal.

Observation forms: Not applicable

Sample Collection Checklist:

Chemical samples as in Parts 4.c.(1) and (2)

10 freshly dead specimens

10 specimens that were dying at the time of collection

10 specimens that were alive at the time of collection

Equipment Checklist: In addition to the following refer to Appendix L.

Snake stick  
Dip net  
Tea strainer  
Turtle trap  
Potato rake  
Stevedore hook  
Collecting bags  
Headlamps  
Lizard noose  
Buffered formalin  
Syringe and needle

<sup>1</sup>Conant, R., A Field Guide to Reptiles and Amphibians. Peterson Field Guide Series, Houghton Mifflin Co., Boston, 1958.

(6) Incidents Involving Land Mammals

(a) Overview: Land mammals include those mammals that spend part of their life in water, such as beaver and otter. The usual causes of incidents involving land mammals are disease, spills of hazardous substances and adverse weather.

(b) Data Collection:

Record Keeping:

Log of incident: Refer to Appendix B.

Marking samples: Refer to Appendix B.

Label: Refer to Appendix B.

Preliminary Information: Obtain the information called for in Appendix A. Also refer to Appendix C.

Physical Observations: Refer to Appendix D.

Chemical Data: Refer to Appendix E.

Biological Data:

Identification of species: Use A Field Guide to the Mammals<sup>1</sup>, and refer to Appendix E.

Permit requirements: Refer to Appendix G.

Biological samples: Refer to Appendix H.

Cholinesterase: The possibility of anticholinesterase intoxication can be investigated by measuring the acetylcholinesterase (AChE) levels in affected mammals and comparing them to levels in healthy mammals that have not been in the area of the incident, or with appropriate levels reported in the literature. Brain and intercostal muscle provide the most reliable measure of AChE levels in dead mammals. Erythrocyte (red cell) AChE is useful because it can be obtained repeatedly from many live mammals without serious trauma. Thus, the AChE level in a given mammal can be followed with time.

<sup>1</sup>Burt, W.H. and R.P. Grossenheider, A Field Guide to the Mammals, Peterson Field Guide Series, Houghton Mifflin Co., Boston, 1964.

Refinement of sample: It may be necessary to obtain the head and samples of intercostal (rib) muscles from dead mammals. Further dissection will be accomplished at the laboratory receiving the sample. It may also be necessary to obtain blood from each live mammal collected. Dissection of large mammals such as deer and horses is best left to a veterinarian.

Head: Sever the neck muscles below the skull with a sharp scalpel. Using bone scissors, cut through the backbone in the neck.

Rib muscles: Shave the hair from an area approximately 7 centimeters (cm) square<sup>1</sup> on the left side of the animal immediately behind the forelegs. Approximately 2 cm to the left of the backbone, cut across the ribs with bone scissors for about 7 cm, paralleling the backbone. At the front and back of this cut, with a scalpel, sever the muscle along a rib (toward the belly) for about 7 cm. With bone scissors, cut between the ends of these last two cuts producing an approximately 7 cm square section of skin, ribs and rib muscle.

#### Blood:

Amounts of blood required: Obtain blood from each mammal in sufficient quantities so that enough undiluted serum and blood cells will be available for the laboratory tests designated by the team leader.

With small mammals, use a disposable plastic syringe and 22 gauge needle. With large mammals (coyotes and larger) use a 1-1/2 inch Vacutainer<sup>R</sup> needle, Vacutainer<sup>R</sup> holder and heparinized Vacutainer<sup>R</sup> tube. The needle should be disposed of each time; the holder can be used repeatedly. With the needle and syringe assembled, insert the needle through the rubber stopper into a bottle of sodium heparin (1,000 units per ml). Flush the syringe and needle with heparin to prevent clogging. Heparin should be kept refrigerated when not in use.

Anesthetize small mammals with CO<sub>2</sub> (Appendix H). Larger mammals (coyotes and larger) can be sampled without anesthetizing if proper restraining techniques are followed (see below).

<sup>1</sup>Required dimensions are approximate. They should be more if the mammal is large, less if the mammal is small. In the latter case, as large a sample as possible should be obtained.

Heart puncture is the simplest method to obtain the blood sample from small mammals. Holding the mammal firmly, insert the needle at a point just posterior to the place where the rib cage ends on the mammal's chest near the mammal's stomach. When a syringe is used, carefully push the needle in and withdraw the plunger from time to time to determine if the heart cavity has been reached (blood will be withdrawn if the needle is in the heart cavity). After the sample is taken, withdraw the needle and insert it into an open, 3 ml heparinized Vacutainer<sup>R</sup> or equivalent. Push the plunger down to evacuate the contents of the syringe into the Vacutainer<sup>R</sup> tube, recap the tube with its top, and dispose of the needle and syringe. When a Vacutainer<sup>R</sup> holder is used, blood will spurt into the Vacutainer<sup>R</sup> tube if the needle is in the heart cavity. Label the heparinized tube with the identification number on the standard label (Appendix B). Labeling is accomplished with a short piece of Time<sup>R</sup> tape or equivalent, and the black felt tip pen. Make certain the number is oriented so that it is read right side up when the heparinized tube is setting with the top up.

Bleeding large mammals can be hazardous. A rope halter may be sufficient restraint when working with horses, if the owner helps to quiet the animal. A chute may be used with caution for horses since they may panic and injure themselves.

Additional restraining techniques may be found in the book Restraint of Animals by Leahy and Barrow which is available from the Cornell Campus Store, Inc., Ithaca, NY 14850.

The external jugular vein is used to bleed horses and cattle. An area over the vein is cleansed by scrubbing with 70 percent alcohol. Finger pressure is applied to block the jugular vein distal (toward the tail) to the head. An 18 gauge, 1-1/2 inch needle on a 10 ml Vacutainer<sup>R</sup> or equivalent, holder is inserted into the raised vein at an angle. As soon as the skin is punctured as evidenced by a drop of blood at the end of the needle in the Vacutainer<sup>R</sup> holder, push the heparinized tube to the bottom of the Vacutainer<sup>R</sup> holder. By so doing the needle in the Vacutainer<sup>R</sup> holder will push through the green stopper in the Vacutainer<sup>R</sup> tube and the vacuum inside the Vacutainer<sup>R</sup> tube will cause the blood to be withdrawn.

About 10 ml of blood is withdrawn. Release the finger pressure and place a clean, dry cotton pledget over the insertion point of the needle and apply pressure on the pledget as the needle is removed from the vein. Label the heparinized tube as in small mammals above.

Preserving technique: Refer to Appendix J.

Brain and intercostal muscle: Immediately after removing, place the head and the section of rib muscle in the same freezer bag. Enclose a standard label (Appendix B), seal the bag and place it in the portable ice chest. Back in your work area, place the bag in a freezer set at  $-21^{\circ}$  Celsius (C). Record appropriate data (Appendix B) in the log of the incident. Place each carcass in a plastic bag and label the bag for disposal (Appendix B) or take additional samples described below (as instructed).

Blood: As soon as possible after collection, the heparinized blood samples are centrifuged in a refrigerated ( $4^{\circ}$  C) centrifuge at 1,000 to 1,500 gravities<sup>1</sup> for 15 minutes. The plasma and "buffy coat" layer are removed from each sample by aspiration. Two volumes of physiological saline solution (Appendix J) are added to each sample to maintain osmotic pressure. Each sample is then mixed gently, by inverting the tubes, and centrifuged as above. The supernatant fluid is removed by aspiration, and the remaining cells are stored at  $-21^{\circ}$  C until assayed.

Botulism: Botulism is not normally encountered in an incident involving mammals. If it is suspected, follow the procedure under "Botulism" in Part 4.c.(2).

Necropsy<sup>2</sup>: Since disease can manifest itself in any organ, a large sample of organs may be necessary. This procedure will also suffice for a parasite survey.

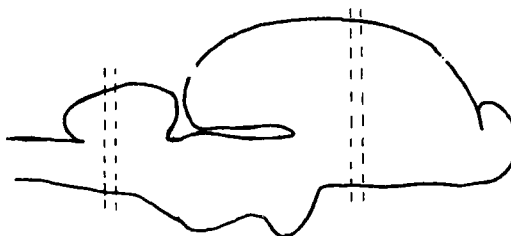
Refinement of sample and preserving technique necessary for samples preserved in formaldehyde: Starting between the eyes, and proceeding toward the rear, cut the skin with a scalpel to the base of the skull. Peel the skin back and with a pair of pliers carefully chip away the roof of the skull. Sever all the nerves entering the brain, remove the brain from the skull. Cut in two along the

<sup>1</sup>The equation for calculating gravities (relative centrifugal force) is:  $.000001118 \times r \times N^2$ ; where  $r$  = rotating radius [centimeters (distance from center of centrifuge head to half way down one of the centrifuge tubes)]; and  $N$  = rotating speed of centrifuge (revolutions per minute).

<sup>2</sup>Further instructions on appropriate tissues to sample for various diseases are found in: Veterinary Services Laboratories, Animal and Plant Health Inspection Service, U.S. Department of Agriculture. Diagnostic Reference Manual, 1974, 71 pp.

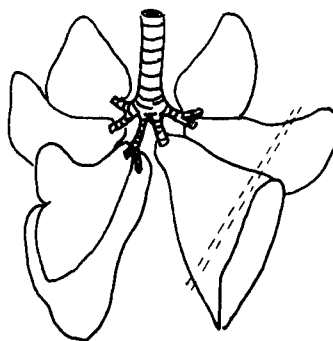


groove that runs down the middle of the brain from front to rear. Cut two slices in the left half no more than 1/4 cm thick as shown:

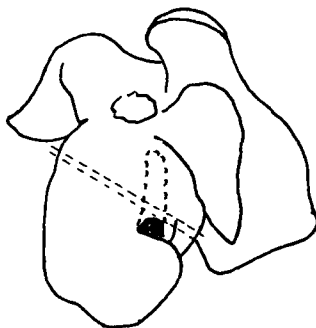


Place slices in a jar containing 4 percent formaldehyde (Appendix J). With a scalpel or sharp scissors, carefully cut the skin and thin muscles lying immediately beneath, in a line extending from the chin to the anus. Peel the tissue away from both sides of the cut. At this point, the esophagus and trachea should be exposed in the neck region and the viscera (intestines etc.) in the stomach region. Lying between the two exposed areas, there should be a mass of muscles attached to the sternum and rib cage. Using a scalpel make a cut on the right side of the sternum extending from the front to the rear. Make the cut deep enough to pass through the sternum, keeping the scissors in contact with the bone so as to avoid injuring internal parts. Spread apart the cut edges. Remove a 1/4 cm thick section from the center of each of the following organs and place in the formaldehyde jar with the sections of the brain. You may be required to remove a representative sample of the contents of the gastrointestinal tract (stomach and intestines) for analysis of the material ingested. Place the samples in a plastic bag (for chemical analysis use a glass jar).

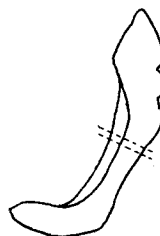
One, 2 cm section from the wind pipe (trachea) and one, 1/4 cm section from the left lung as shown:



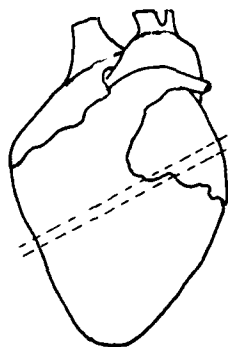
One, 1/4 cm section from the liver so as to include the gall bladder<sup>1</sup> as shown:



One, 1/4 cm section from the spleen as shown:



One, 1/4 cm section across the center of the heart as shown:

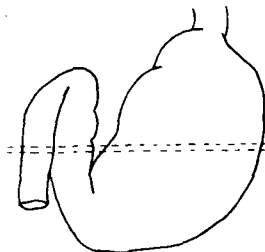


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<sup>1</sup>Deer and horses do not have gall bladders.

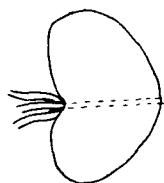
One, 1/2 cm section from the esophagus

One, 1/4 cm section from the stomach<sup>1</sup> as shown:



One, 2 cm section from the small intestine and one, 2 cm section from the large intestine

One, 1/2 cm section from the left kidney as shown:



Finally remove the skin from the left leg and slice off a 1/4 cm thick section of the leg muscle extending the cut down to the bone and around the leg far enough to include a slice of at least 1/2 of the muscles that surround the bone at that point.

Tape<sup>2</sup> a standard label (Appendix B) on the glass jar and enter the appropriate data in the log (Appendix B).

Keep the above samples in the formaldehyde for at least 24 hours to allow adequate fixing. After 24 hours, remove and place the sections in gauze (soaked in formaldehyde). Seal the samples in plastic bags.

When a standard sample (Appendix H) has been obtained, send it to the receiving laboratory using the shipping method for non-frozen samples (Appendix K).

<sup>1</sup>In even-toed, hooved animals such as antelope, deer, cattle and sheep, the stomach is divided into three compartments (ruminant mammal). In this case take one, 1/4 cm section through each compartment of the stomach.

<sup>2</sup>Adhesive tape applied so as not to cover data on the label

Refinement of samples and preserving technique for frozen necropsy samples: Remove the remainder of the viscera (lungs, heart, intestines, etc.) and carefully tie off the cut ends of the digestive system organs. Place the viscera, with the remnants of the organs sectioned for the formaldehyde fixing procedure, into a single freezer bag. For these samples and the samples of ingested material in the gastrointestinal tract, include the standard labels, record the appropriate data in the log and place the bags in the portable ice chest. Upon returning to your work area, place the bags in a freezer set at  $-21^{\circ}\text{C}$ .

Pathogens: Bacterial, viral, rickettsial and fungal diseases can be centered in many organs. Any organ with evidence of necrosis, enlargement, abscess, discoloration, or hemorrhage should be cultured for bacteria or fungi. The organs or tissues from which the most common agents of disease in mammals are likely to be isolated are the following: lungs (air sacs), liver, intestine, heart (inside surface of the pericardium - the thin tissue surrounding the heart), blood, brain, and bone marrow. (A good bone to use is the tibia - the larger of the two bones in the lower leg.)

Refinement of sample and preserving technique: Allow as little time as possible, no more than a few hours, between collection and initiation of these procedures. In the meantime, refrigerate (do not freeze) the samples.

Contamination of the sample with the fast-reproducing microorganisms from surfaces, personnel or instruments may obscure slow-growing pathogens in the sample. As a consequence, extreme care must be taken to use sterile procedures.

Sterile instruments, swabs, scalpels, scissors, syringes, tubes, covered dishes, etc. will be required. Instruments used to prepare tissues should be sterilized by flaming. Surfaces exposed to the air, such as the skin or organ surface (see "Necropsy", page 4-30 for dissection directions) should be seared with a hot blade just prior to securing the sample. Once a surface is sterilized, cut into the organ with a sterile scalpel and secure a sample from the cut surface. Fluids such as blood (see cholinesterase, page 4-27) should be placed in a sterile container and labeled with proper identification number<sup>1</sup>. It is recommended that two sampling procedures be used on each tissue sampled: (1) one swab sample used to inoculate the media immediately and (2) a second swab sample to be sent to the receiving laboratory in its original state. (Culturette<sup>R</sup> or equivalent swabs are best to use

<sup>1</sup>Refer to Chapter 2, U.S. Department of the Army, Laboratory Procedures in Clinical Bacteriology, TM 8-227-5, Apr 1963.

for the latter since they have a capsule of transport medium which can maintain organisms for at least 24 to 48 hours.)

Because microorganisms have different atmospheric and nutritional requirements, it will be necessary to make several cultures from each tissue sampled. It is recommended that each media<sup>1</sup> be incubated in the following atmospheres: aerobic, anaerobic, carbon dioxide enriched<sup>2</sup>.

Shipping technique<sup>3</sup>: After labeling everything with the standard label (Appendix B) dispose of the carcasses properly (Appendix B) and after 24 hours, send the cultures, Culturette<sup>R</sup> swabs, blood sera and the anaerobic jars to the receiving laboratory via the appropriate shipping method (Appendix K).

Observation Checklist: No routine forms available.

Sample Collection Checklist:

Chemical data: Water - 10, 1-liter samples

Mud silt and sludge - sufficient samples to cover area of the incident.

Aquatic plants - sufficient samples in 20 cubic centimeter vials.

Terrestrial plants - pressed samples of plants of interest.

Biological data: Where appropriate the following samples from 5 to 10 freshly dead, 5 to 10 dying and 5 to 10 animals alive and well at the time of capture:

Cholinesterase:

whole head

<sup>1</sup>The media to be used will be determined by the team leader or receiving laboratory.

<sup>2</sup>Refer to Chapter 4, U.S. Department of the Army, Laboratory Procedures in Clinical Bacteriology, TM 8-227-5, Apr 1963.

<sup>3</sup>Refer to Chapter 2, pages 2-13 through 2-17, U.S. Department of the Army, Laboratory Procedures in Clinical Bacteriology, TM 8-227-5, Apr 1963.

7 cm square of ribs and intercostal muscles  
sufficient sample of blood

Necropsy, formaldehyde:

two, 1/4 cm slices of brain tissue  
one, 2 cm slice of trachea  
one, 1/4 cm slice of trachea  
one, 1/4 cm slice of lung  
one, 1/4 cm slice of kidney and gall bladder  
one, 1/4 cm slice of spleen  
one, 1/4 cm slice of heart  
one, 1/2 cm slice of esophagus  
one, 1/4 cm slice of stomach  
one, 2 cm slice of small intestine  
one, 2 cm slice of large intestine  
one, 1/4 cm slice of leg muscle

Necropsy, freezing:

the remainder of the tissues sampled, but not  
included in the "Necropsy, formaldehyde" samples above.

Pathogens from possibly diseased tissue:

atmosphere. one tube of medium inoculated in aerobic  
atmosphere. one tube of medium inoculated in anaerobic  
enriched atmosphere. one tube of medium inoculated in carbon dioxide

Culturette<sup>R</sup> swabs or equivalent

Equipment Checklist: In addition to the following refer to Appendix L.

Scotch tape, or equivalent  
Razor  
Bone scissors  
Propane torch  
Freezer bag  
Portable ice chest (field  
-21° C Freezer (work area)  
Prenumbered cardboard tags  
Prenumbered strips of tape  
Black permanent ink felt-tip pen  
Circular key ring  
Stainless steel tape board  
Vacutainer<sup>R</sup> needles, or equivalent  
10 ml Vacutainer<sup>R</sup> holder, or equivalent  
Heparinized Vacutainer<sup>R</sup> tubes, or equivalent  
70 Percent alcohol  
Sterile cotton pledgets  
Saline solution  
Centrifuge (work area)  
Sterile, disposable glass syringes  
25 Gauge needles  
Dry ice  
CO<sub>2</sub> anesthetizing jar  
3 ml Heparinized Vacutainer<sup>R</sup>, or equivalent  
Time<sup>R</sup> tape, or equivalent  
Saline solution  
Pliers  
4 Percent formaldehyde  
Sharp scissors  
Small blow torch (field) or bunsen burner (work area)  
Culturette<sup>R</sup> swabs, or equivalent  
Sterile containers  
Culture tubes  
Aerobic medium  
Anaerobic medium  
Anaerobic jar  
Carbon dioxide enriched medium  
Incubator  
Anaerobic catalyst and generator  
Candle  
Jar with tight fitting lid  
Matches  
Petri dishes

d. ANIMAL RESCUE

Oiled Birds and Mammals

Overview: There are two aspects to rescuing birds and mammals threatened by or involved in an oil spill: (1) methods of collection and care and (2) methods of animal dispersal.

Rescue methods: Appendix III of the Pollution Response Plan for Oil and Hazardous Substances<sup>1</sup>, thoroughly covers dispersal methods. Appendix IV of the same document thoroughly addresses collection and care of oiled vertebrates.

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<sup>1</sup>Office of Migratory Bird Management and Office of the Coordinator, Environmental Contaminants Evaluation Program, U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. U.S. Fish and Wildlife Service Pollution Response Plan for Oil and Hazardous Substances. June 1, 1977.



PART 5. APPENDIXES

APPENDIX A. FACT SHEET ON THE INCIDENT

1. Identification of agency and person making the telephone call:
  - a. Name:
  - b. Title:
  - c. Organization:
  - d. Telephone number:
  - e. Address:
2. Date and time incident was discovered:
3. Location of the problem:
  - a. State:
  - b. County:
  - c. Site of incident:
    - (1) longitude:
    - (2) latitude:
    - (3) approximate area in acres:
  - d. Nearest town:
  - e. Nearest commercial airport:
  - f. Brief description of habitat:
  - g. Human population density:
4. Statement of the problem:
  - a. Species, sex and age of affected domestic animals and wildlife if known; be as specific as possible, i.e.; mallards and Canada geese rather than ducks or geese:
  - b. Identification of any rare and endangered species, or other critical species involved (indicate unknown if not known and none if there is none):

c. Date of onset of incident if known, or best estimate if unknown (indicate estimated dates):

d. Conditions and symptoms:

- (1) Are animals dying?
- (2) Is death rapid or slow; violent or calm?
- (3) How many (by species) have died?
- (4) Are the carcasses concentrated in one or several locations or are they randomly dispersed?

5. Supplemental information:

a. Are domestic animals or humans (estimated density) on or near the problem area?

b. What are the prevalent diseases of domestic animals and wildlife in the area?

c. Do domestic animal owners vaccinate for any disease?

d. What is the prevalent habitat?

e. What are the major water supplies?

f. What are the animals eating, if known?

g. Has anything unusual happened in the area recently (drought, flood, land clearing, infestation of insects, heavy pesticide use, changes in types of crops planted, etc.)?

h. Has anything along the lines of the present problem ever occurred before in the locality?

i. Could anyone have intentionally or unintentionally poisoned the animals?

j. What is your opinion and that of local persons as to the cause of the problem?

6. Other agencies being contacted to aid in the investigation of the problem (indicate none or unknown as appropriate):

a. Name of agency:

b. Name of individual contact within agency:

c. Telephone number of agency and individual:

7. Additional pertinent information:

## APPENDIX B - RECORD KEEPING

### Log(s) of the Incident

An incident may require the concurrent participation of separate activity groups such as: (1) transportation, (2) animal rescue, (3) sampling, (4) photography, and (5) carcass disposal. Each of the group leaders will keep a log of his group's participation in the incident as follows:

The log should be maintained in a permanently bound notebook by one individual; if several people make entries, each individual will initial the entry. Each page should be numbered consecutively. Each entry should begin with the date and time of the event described in the log and the initials of the individual. Always identify the location of the event, preferably by referring to a site number on a map (Appendix D) in which case the map should be taped to the log book. Always identify those people accompanying you as witnesses to the event. Describe as much detail as possible - often seemingly insignificant observations turn out to be very significant in determining the cause. Sign your name to the lower left corner of each page. All entries will be made with an ink-type pen using waterproof ink. Erroneous entries will be lined-out with a single line, initialed and dated. For legal purposes the log should be handled as a document For Official Use Only (FOUO).

In addition to the above group log(s), a master log, in typed form, will be kept by a separate individual. This log will incorporate the entries in the group logs in chronological order. It is not legally binding, but serves the purpose of identifying information gaps in the group log(s) so that the group log(s) can be corrected by the group leaders. It also consolidates the information on the incident in one document.

### Marking Samples

Identify each large animal (carcass or live animal to be released) with a sequential number (at least 15 cm high) sprayed on its right and/or left side. Use bright orange automotive lacquer spray paint. Place each small carcass in a separate plastic bag<sup>1</sup> along with a pre-numbered,

<sup>1</sup>For incidents involving large numbers of small animals, as in fish kills, 10 to 100 carcasses can be placed in each bag.

round cardboard tag<sup>1</sup>. Place a strip of tape<sup>2</sup> with the same number as on the tag on the outside of the bag.

Fill out appropriate entries on a standard label (below) for each sample. The identification number is the number you sprayed on the larger animals or placed on the container containing the sample.<sup>3</sup> Attach the label to the log (above). Beneath the label, enter remaining data. Chemical data should be handled similarly.

#### Label

Figure B-1 is a series of standard labels. The page can be reproduced and the labels cut out for use. Explanation of entries is as follows:

"ID No." - The identification number used to mark the sample.

"Species" - The kind of animal collected. (Appendix F)

"Sex" - M, male or F, female. In most cases you will be trained to sex the animals collected.

"Age" - J, juvenile; S, subadult or A, adult. In most cases you will be trained to age the animals collected.

"Condition" - Alive, sick, dead-shot etc.

"Collector" - Your name (also name other people present when the sample was collected).

"Coll date" - The date the sample was collected.

<sup>1</sup>The cardboard tag is prepared by numbering the cardboard with black, permanent ink felt tip pen and placing the tag on a circular ring.

<sup>2</sup>The tape is prepared by sticking 25 mm wide strips of yellow TimeR tape or equivalent, to a sheet of stainless steel, then numbering short segments of the tape sequentially. When numbering both the cardboard tag and tape, place a short line under each number to ensure the number is read right-side up. In the field, as needed, use a scalpel to cut the prenumbered tape segments off the sheet of stainless steel.

<sup>3</sup>Wet specimens may require a different labeling technique. Refer to Chapter 2, Section 3, paragraph 17, U.S. Department of the Army, Methods of Preparing Pathologic Specimens for Storage and Shipment, TM 8-340, Sep 1963.

ID No _____	Coll Location-site _____
Species _____	County _____
Sex _____ Age _____	State _____
Condition _____	Sample Type _____
Collector _____	Organ(s) _____
Coll Date _____	_____
-----	
ID No _____	Coll Location-site _____
Species _____	County _____
Sex _____ Age _____	State _____
Condition _____	Sample Type _____
Collector _____	Organ(s) _____
Coll Date _____	_____
-----	
ID No _____	Coll Location-site _____
Species _____	County _____
Sex _____ Age _____	State _____
Condition _____	Sample Type _____
Collector _____	Organ(s) _____
Coll Date _____	_____
-----	
ID No _____	Coll Location-site _____
Species _____	County _____
Sex _____ Age _____	State _____
Condition _____	Sample Type _____
Collector _____	Organ(s) _____
Coll Date _____	_____
-----	
ID No _____	Coll Location-site _____
Species _____	County _____
Sex _____ Age _____	State _____
Condition _____	Sample Type _____
Collector _____	Organ(s) _____
Coll Date _____	_____
-----	

Figure B-1. Standard labels

"Coll Location-site" - The site where the sample was collected. Refer to a place name found on your map. For example: "Orr Springs" "10 km NNW Hatch Ranch". (Note: use metric system, km - kilometers and N, E, S, W for North, East, South and West respectively).

"Sample type" - Cholinesterase, botulism, necropsy, bacterial, plant, sludge, etc.

"Organs" - Brain, intercostal muscle, stomach, etc.

Don't worry about things that you cannot determine. For example, in some species age and sex can readily be determined, in others they cannot. Some causes of death will be quite evident, such as shooting. In other cases the causes will not be known.

#### Carcass and Sample Disposal

If practical, all carcasses and samples will be preserved (frozen or refrigerated) until the commander of the medical activity on the installation determines that the material is no longer needed for the study, at which time he will determine the proper method of disposal.

#### APPENDIX C - PRELIMINARY INFORMATION

In addition to Appendix A information, obtain signed reports from the witnesses who first discovered the incident. Be sure the witnesses include dates, times and their observations on the incident. (Why they were there, the prior times they were there (if any), what they saw each time.)

#### APPENDIX D - PHYSICAL OBSERVATIONS

A map of the site of the incident is essential and each member of the investigating team should have a supply of maps so that each major place and event can be located accurately, including sampling points, locations of prior incidents and known sources of pollution. The installation Environmental Impact Assessment in Volume 2 (especially Sections A.2.g, A.2.d, B.1.d, and C.4.c) will be useful for background information. U.S. Geological Survey topographic map indexes, published for each state, Puerto Rico, the Virgin Islands, Guam and American Samoa, are available free from the U.S. Geological Survey, Washington, DC 20244 or the Federal Center, Denver, CO 80225. Appropriate quadrangles may be ordered at minimal cost from agencies identified on these indexes. Most facilities engineering directorates have all quadrangles for the installation. The maps may be purchased at sporting goods stores in some areas. Usually, the most desirable scale is the one showing the greatest detail of the area.

Photographs, preferably both color and black-and-white prints, should be taken to record and substantiate the physical conditions observed at the site of the incident. A professional photographer, if available, should take the photographs to insure proper photographic technique.

Weather conditions prevailing at the time of the incident and for a week or more prior thereto should be noted. These data can be obtained from weather bureau sources (refer to Volume 2, Section A.2.a). Special attention should be given to precipitation and temperature extremes. Anything else that could aid in explaining the incident should be recorded and investigated.



## APPENDIX E - CHEMICAL DATA

Permission to obtain samples from areas off the installation will be obtained prior to their collection.

### Water Samples

Collect water samples for chemical analyses in clean bottles. A 1-liter sample is minimal, and 10 such samples from different areas of the incident may prove valuable. Clean the bottles before use as follows: rinse bottles and caps successively with chromic acid cleaning solution, running tap water, distilled water, and finally several times with redistilled solvent (e.g., acetone, hexane, petroleum ether, or chloroform). Remove residual solvent by air drying the bottles.

### Mud, Silt and Sludge Samples

Collect mud, silt and sludge samples for chemical analyses. Collect the samples with a sediment corer. Divide the core into several sections and label each section. Place individual mud and silt sections in new plastic bags or in glass containers cleaned as for water samples. The glass bottles should have a screw type cap lined with Teflon<sup>R</sup>.

Where possible, freeze the samples immediately after collection. When freezing is impossible, preserve the samples with 4 percent formaldehyde (Appendix J), or dry them rapidly. The method of preservation should be indicated on the sample label. Type of container depends upon analyses (Appendix I).

### Plant Samples

Collect plant materials for chemical analysis and identification of toxic species. Aquatic plants can be preserved in 4 percent formaldehyde or stored at 6° C. Approximately 10 milliliters of concentrated material in a 20 cubic centimeter vial is an appropriate sample. Terrestrial plants should be collected and dried as described in Volume 4, Chapter 5. In some states, collecting permits must be obtained before collecting plants.

### Soil Samples

Collect soil samples for chemical analysis. The sampling device (Figure E-1) is a steel cylindrical coring instrument fitted with four brass sleeves for differentiating surface and subsurface soil levels and a rod-type plunger for removing the brass rings (containing the soil plug).

The brass sleeves are 3 centimeters (cm) (two each) and 1 cm (two each) wide, arranged in the cylinder in the order 3-1-1-3, making a

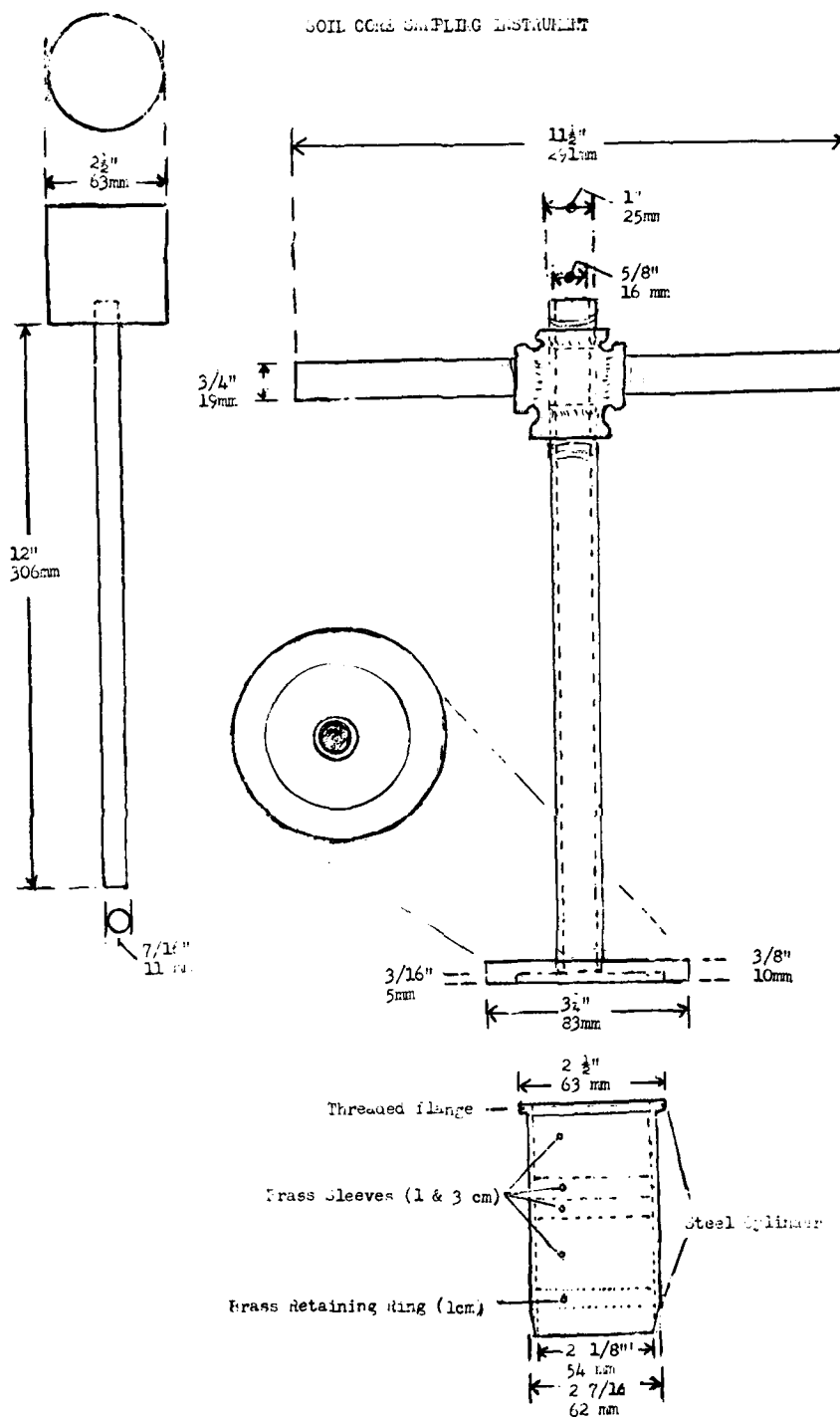


Figure E-1. Core Sampler Used to Obtain Soil Samples.

total sampling depth of 8 cm. The two middle 1-cm rings delineate a definite boundary between surface and subsurface samples. Before taking each sample, clean the brass rings by washing them thoroughly in distilled water.

Drive the steel cylinder full length into the soil, twist it around completely several times and then remove it from the soil. Push out the brass sleeves containing the soil plug. Separate surface and subsurface samples by removing the cores from the top, 3-cm ring (67.2cc) and the bottom, 3-cm ring. Discard the middle two, 1-cm cores of soil to assure a distinct separation between surface and subsurface samples. Enclose each 3-cm sample in a separate Twist lock<sup>R</sup> bag or equivalent, label and record time, date and area sampled.

Take random samples from the site by the method outlined in Volume 4, Chapter 1. Samples also can be obtained from non-random points that appear to be contaminated. Obtain enough samples to cover the area of the incident satisfactorily.

## APPENDIX F - IDENTIFICATION OF SPECIES

State or area animal and plant keys are used where available, for identifying species. Generally keys are available through local universities or the state Fish and Game Departments. Chapter VI, Data Sources, in Study of Ecological Classification and Inventory Manual<sup>1</sup> provides detailed checklists to regional keys. National guides to identification are found in Volume 2, Appendix B, page B-12.

Even with the above aides, the team leader may determine that some taxa are too difficult for all but trained taxonomists. These taxa will be prepared as whole frozen specimens (Appendix J) and sent to the agency<sup>2</sup> designated by the team leader as per instructions in Appendix K.

<sup>1</sup>U.S. Department of the Navy, Naval Facilities Engineering Command, Alexandria, VA 22332. Study of Ecological Classification and Inventory Manual, Oct 1977.

<sup>2</sup>The Registry of Systematics Resources and Services (RSRS). Association of Systematics Collections Museum of Natural History, University of Kansas, Lawrence, KS 66045, Phone: 913 864-4867; FTS: 752-2312 is a data base that identifies names, addresses and phone numbers of specialists willing to provide a variety of services in the fields of plant and animal taxonomy. Ms. Rebecca A. Pyles is the point of contact.

## APPENDIX G - PERMIT REQUIREMENTS

Permits are required to collect many types of live and dead animals and plants. In many cases the team leader will already have a valid collecting permit. If so, all collections will be made under the provisions of his permit. If not, one may be obtained by contacting the U.S. Fish and Wildlife Service Area Manager (II, Part 2) who will in turn contact his regional law enforcement division (IIa, Part 2). They will arrange for emergency federal permits and take care of state permits at the same time. The team leader may have to list the names of individual field workers collecting with him, and the numbers and names of the species to be collected. Accurate records must be kept since both state and federal agencies require an annual report listing the animals taken under each permit and their disposition.

Permits are required even if all collecting is confined to the military installation.

## APPENDIX H - BIOLOGICAL SAMPLES

Permission to obtain samples from areas off the installation will be obtained prior to their collection.

A standard sample<sup>1</sup> is 5 to 10 whole animals or appropriate samples from 5 to 10 animals. A standard sample should be obtained from each of the following three categories: (1) freshly dead (clear eyes, scales, feather or hair comes out with difficulty, no fetid smell, body limp and possibly still warm), (2) dying, and (3) apparently healthy. Select species which seem to be most susceptible to mortality.

When it is necessary to anesthetize or to kill a live-collected terrestrial animal, the most humane method is to place the animal in an air-tight jar with a large chunk of dry ice (CO<sub>2</sub>) until it is properly anesthetized or dead. Animals too large for this procedure may be killed with a shotgun slug or large caliber bullet between the eyes (if brain sample is not required).

Live, health birds and larger mammals (rabbits to coyotes) can be collected by shooting. Small birds can be live-collected with Japanese mist nets<sup>2</sup>. Small and medium-sized mammals can be live-collected by the techniques outlined in Volume 4, Chapter 8. Use carcasses of small mammals as bait for medium-sized carnivores. Because large mammals (deer, horses, etc.) require special equipment and skills to capture alive, they should be captured only by individuals such as veterinarians or wildlife biologists who are familiar with the proper handling techniques.

Prior to any studies with domestic animals, written permission must be obtained from the owner. Obtaining this permission, frequently requires a degree of salesmanship which is often aided by a brief explanation to the owner of the purpose of the study, and what will be done to the animal by trained personnel. Many of the animals are of economic or sentimental value and poor technique in handling may be disastrous to public relations. In the event of injury or death due to handling, the question of liability must be addressed.

<sup>1</sup>In most cases, this sample size is considered to be adequate to determine presence or absence of a pollutant.

<sup>2</sup>Refer to page 28 through 34 of U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA 30333. Collection and Processing of Vertebrate Specimens for Arbovirus Studies, W.D. Sudia, R.D. Lord and R.O. Hayes, 65 pp. 1972.

## APPENDIX I - PROCESSING OF SAMPLE

Be sure the laboratory is willing to analyze the samples. Notify the laboratory of the approximate numbers and kinds of samples that will be sent, the types of analyses required, the date of arrival, the date the analytical results will be needed and to whom the results should be sent. Also establish that your collecting and preserving techniques are compatible with analytical techniques of the laboratory.

Wherever practical, samples from animals should be collected in the field. Sterile procedure will be followed where possible. Therefore, immediately prior to using the scalpel, straight-edge razor or bone scissors to take a sample from an animal, place a new blade in the scalpel and flame the blade, the razor (blade only) or cutting portion of the bone shears with a torch or Bunsen burner. (NOTE: The above procedure will be followed for each sample from each animal.)

## APPENDIX J - PRESERVING TECHNIQUE

Buffered formalin (4 percent formaldehyde) for tissue preservation<sup>1</sup> is prepared as follows:

40 percent formaldehyde - 2.0 liters

Distilled water - 18.0 liters

Dibasic sodium phosphate - 130.0 grams

Monobasic sodium phosphate - 80.0 grams

Mix until solution is clear. Place specimens in containers so that there is one part specimen to 4 parts formalin. Inject formalin into body cavities of rats and larger animals.

Frozen samples should be handled as per the instructions of the receiving laboratory.

Physiological saline solution is 0.9 percent NaCl in distilled water.

<sup>1</sup>Refer to Chapter 2, Section III, paragraph 16 and 18, U.S. Department of the Army, Methods of Preparing Pathologic Specimens for Storage and Shipment, TM 8-34, Sep 1963.



## APPENDIX K - SHIPMENT OF SAMPLE

In general, the following will apply to material being shipped; however, it is always advisable to contact the receiving laboratory directly to be certain that it constitutes an approved procedure. For example, some laboratories insist that the sample be in the custody of a courier at all times. Organs contaminated with certain diseases cannot be shipped without prior approval from proper authorities. If an unauthorized shipment of a contagious disease arrives at the receiving laboratory and is opened without the proper precautions, considerable panic can result. A more thorough discussion of whom to contact, under what circumstances, can be found on pages 1 through 3 of the Diagnostic Reference Manual<sup>1</sup>. In general, styrofoam coolers enclosed in boxes make the best shipping containers regardless of the method of preservation.

1. Shipping Method for Frozen Samples<sup>2</sup>: Unless arrangements have been made to receive samples on the weekends, samples should be sent on Monday or Tuesday. Early in the morning wrap all standard samples (Appendix H) of frozen specimens in insulating material then place them in styrofoam coolers with at least 5 cm of dry ice between them and all sides of the cooler. Enclose two reproduced copies of each page (from the log) containing any data on the specimens being sent. Securely close all openings in the box with masking tape. Label boxes in bold red letters: frozen scientific specimens - do not store in warm areas", and "upon arrival at airport call \_\_\_\_\_" put the number of the receiving laboratory in the blank space. Obtain a bill of lading from your transportation office and immediately take the boxes to the nearest air freight office and send them on the most direct flight to the airport nearest the receiving laboratory. Notify the laboratory by telephone of all shipping information and provide the name of the airport, the airline, the flight number, the expected time of arrival and the bill of lading number.

<sup>1</sup>Veterinary Services Laboratories, Animal and Plant Health Inspection Service, U.S. Department of Agriculture. Diagnostic Reference Manual, 1974.

<sup>2</sup>Also refer to Chapter 2, Section V, paragraph 26 U.S. Department of the Army, Methods of Preparing Pathologic Specimens for Storage and Shipment, TM 8-340, Sep 1963.

2. Shipping Method for Non-frozen Samples<sup>1</sup>: The only differences between this and the preceding method are that the space occupied by dry ice is filled with shock absorbing material, and the label is changed to read "Scientific specimens - store at room temperature" and "Upon arrival at airport call".

<sup>1</sup>Also refer to Chapter 2, Section III, paragraph 19, U.S. Department of the Army, Methods of Preparing Pathologic Specimens for Storage and Shipment, TM 8-340, Sep 1963.

## APPENDIX L - GENERAL EQUIPMENT<sup>1</sup>

Vehicle (preferably 4-wheel drive)

Map of site (Appendix D)

Log (Appendix B)

Standard labels (Appendix B)

Well-lighted work area with running water, distilled water, adequate bench space, telephones and 110 and 220 V outlets

Bright orange automotive laquer spray paint

Books or keys for the identification of specimens (Appendix F)

Ink pen filled with indelible ink

Collecting permits (Appendix G)

Scalpel and sterile blades

Surgeon's gloves

100-ft tape rule

Stop watch

Photograph equipment

Camera

Film

Lenses

Filters

Sample containers

Plastic bags (including trash bags for carcass disposal)

Bag ties

For Federal Supply Catalog number of some of these items, refer to Appendix I, U.S. Department of the Army, *Methods of Preparing Pathologic Specimens for Storage and Shipment*, TM-8-340, Sep 1963.

Whirl-Pak<sup>R</sup> bags, or equivalent

20 cubic centimeter vials

Various glass or plastic jars to 1.5 liter size

Syringes

Hypodermic needles

Shipping excelsior or shredded paper

Shipping cartons (styrofoam coolers)

Dry ice

Masking tape

Bill of lading

List additional equipment unique to your installation:

# APPENDIX M - DISTRIBUTION LIST

	<u>Number of Copies</u>
Office, Secretary of Defense ATTN: OASD (MRA&L) Rm 3E784, Pentagon Washington, DC 20301	1
Office, Secretary of the Army ATTN: OSA (CW) Rm 2E569, Pentagon Washington, DC 20310	1
Headquarters, Department of the Army Deputy for Science and Technology Office, Assistant Secretary of the Army (R&D) Rm 3E390, Pentagon Washington, DC 20301	1
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